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Guam

The Classical Amphibious Operation

Major General P. A. Del Valle, *United States Marine Corps*

General Del Valle, who was Artillery Commander of the 1st Marine Division at Guadalcanal and later commanded the same division at Okinawa, was Corps Artillery Officer, III Marine Amphibious Corps, during the Guam operation.—THE EDITOR.

WORLD WAR I provided us with only two notable examples of amphibious operations: the Oessel Islands campaign, in which the Russians were caught unprepared by the Germans and were handily beaten, offering few lessons of any value to the military student; and the British campaign in the Dardanelles, when the German von Sanders conducted an admirable defense with Turkish troops. But here again the attack furnishes the student little except a long list of "don'ts." Strange to say, Sir Charles Townsend's Mesopotamian Campaign, and especially the assault of the Turkish position at the confluence of the Tigris and Euphrates Rivers furnished the most valuable lessons concerning amphibious operations derived from that war. The attack, while not made from the sea, was made over the flooded area behind which the Turkish position was situated. In the solution of the problems presented, Sir Charles gave us the key to one of our foremost problems. He discovered that an almost normal deployment could be achieved in boats, providing the boats did not contain too many men, were relatively fast, and were maneuverable to the water's edge.

All in all, experience was so limited that when the task of formulating the doctrines and techniques of landing operations was given to the Marine Corps just after the war, we were forced to proceed along lines not strictly empirical, devising rational theories as best we could. The trial of these theories in the yearly maneuvers brought about modifications, improvements, and new theories. Thus were evolved certain principles or conditions peculiar to this type of operation, the effective application of which would tend to give us the maximum chance of success. While we were pointing toward the Pacific as the most likely place for putting our theories into actual practice, we tried to evolve a technique which would apply in general to any amphibious attack.

At Guadalcanal we first tried out our system and found it essentially sound. But the resistance to the actual landing was nil on the main island, and the smaller operations at Tulagi, Tanambago, and Gavutu were relatively unimportant from the point of view of the military student. Here, however, we encountered certain basic difficulties, such as the need for a better system of naval gunfire and air support, and the more rapid and orderly disposal of matériel from the landing beaches. A single ship standing in to point blank range was proved to be worth a half dozen potting away at normal or safe ranges. This paralleled the British experience at

A beach on Guam. Note reefs which stopped most landing craft. (U.S. Marine Corps photo.)

Gallipoli, where HMS *Terror* did such magnificient work on the one successful landing. The need of better coordination of all fires, including air fires, was shown only in dim outline, due to the nature of the resistance met.

The remainder of the Solomons campaigns, and the experiences met in the Gilberts and Marshalls gradually gave us the answers to many of the problems which confronted us. We, therefore, approached the Marianas with more confidence than we had ever had before, and with more reason for it. Our amphibian vehicles were now getting into their stride and providing us with the means of approaching the beaches on a relatively broad front, and with sufficient speed and maneuverability to enable us to overcome the reefs, the ubiquitous nuisance which faced us all the way to Okinawa, and giving us the speed of approach required for relative safety.

The Saipan operation was undertaken with the thought that the Navy would be able, after a few days, to release sufficient tonnage of various sorts, especially bombardment ships, to make the

Guam attack shortly afterwards. As it happened, this was not the case, and the Guam Attack Force patrolled the sea lanes backwards and forwards from the Marshalls to the Marianas until we finally dropped anchor in Eniwetok to await two developments; one was that stage of the Saipan campaign at which the Navy *could* divert the required tonnage; and the other was the arrival of the 77th (Army) Infantry Division. This division was in area reserve in Hawaii at the time, alerted but not embarked. The lessons of Saipan had indicated the need to have a floating reserve handy to exploit the initial impulse. The presence of this division furnished another classical touch to the amphibious attack in that the assault forces of Marines would be passed through by the exploiting forces of the Army, releasing the former for future landing assaults, and giving the latter the land warfare tasks of pushing the campaign to its conclusion. The presence of a floating reserve, ready to exploit success in any direction, and the fact that the landing plan called for more than one landing also added to the sum total of features which went to make Guam a classic. All these items were conceptions of the original planners who, back in 1921, with dismal lack of general interest in the subject, and with woeful insufficiency of funds and means, began their labors on what eventually evolved into the naval secret documents which dealt with the problem. The fleet training directives on the subject are a monument to those whose faith, patience, and foresight gave birth to a new wrinkle in warfare without which World War II could never have been successfully prosecuted.

The thirty-three day's delay caused by Saipan enabled us to apply to Guam the first and most important principle in amphibious warfare, to wit: a carefully coordinated, overwhelmingly strong fire preparation from sea and air. To Admiral Conolly fell the command of the Guam task force, and to him belongs the credit for the classical perfection of the fire effort on Guam. He brought to the expedition the benefit of his experience in the Mediterranean, and his firm insistence upon close fire support, earning for him the soubriquet of "Come in Closer" Conolly from the way he pursued this tactic. He was embarked in the *Appalachian*, lovingly nicknamed "The Big Apple," a thin skinned command ship which he took in close enough to the enemy's guns to be blown sky high. His example was followed by combatant ships with such effect that we landed with a minimum of losses. Only once did the "Big Apple" draw hostile fire; the day before the landing a few desultory six-inch shells dropped near her, without accelerating her withdrawal or even ruffling her dignity.

Ideal also were the air-fires delivered by Admiral Mitscher. Well coordinated with and supplementing the fires delivered by the ships, these fires materially assisted in pounding the enemy into such a stupor that his resistance to our landings was ineffectual. Daily the photographic records of targets taken under attack were analyzed in the flagship where the Corps Commander, General Geiger, the Amphibious Force Commander, Admiral Conolly, together with the Corps Artillery Commander and the gunnery and air support officers discussed the effect of the fire attacks to date and made plans for the ensuing fires. It was, in effect, a seagoing target-information center which covered pretty nearly perfectly the requirements of the case.

The handling of the 5th Fleet, which covered the Marianas operations, furnishes yet another classical touch. Here, just as visualized by the students who worked out the manual, an enemy fleet undertook to dispute the sea and air in

the theater. The Japanese fleet made a sortie, with a rendezvous northeast of the Philippines and launched all their available carrier based aircraft in our direction. The reaction of our own carrier based planes under Admiral Mitscher was violent and effective. The Japanese naval aviation was practically annihilated and never again was of much account during the war.

At this stage the opportunity presented itself to the 5th Fleet Commander to move out and sink the Japanese Fleet, now destitute of aerial support. Such action, however, might have compromised the success of the landing operations. That Admiral Spruance refused to be tempted away from his mission will forever remain a monument to his judgment and unselfishness.

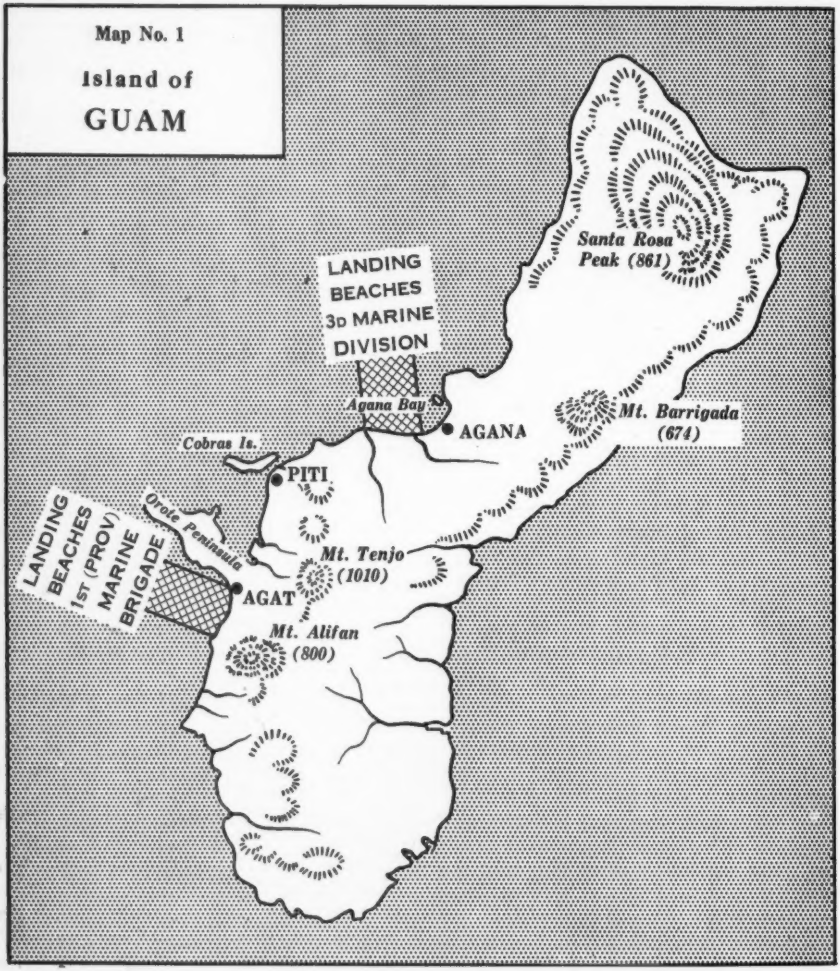
One more activity of the Navy in this landing operation deserves more than passing notice. It was the work of the underwater demolition teams. The long lines of beach obstacles erected by the Japanese on the reefs opposite both projected landing beaches were designed to stop our landing craft along that line, whereupon they would be attacked by previously registered fires from various caliber guns included in the beach defenses. Range markers along these obstacles were

Marines hit the beach on Guam. (U.S. Marine Corps photo.)

silent but eloquent witnesses to the design of the defender in this respect. The especially trained and equipped underwater demolition teams which which the Navy attacked this problem gained the hearty respect and admiration of all by the coolness, courage and efficiency with which they accomplished their tasks. Proceeding to the beach in small boats under cover of what may be termed a "box barrage" from the light craft opposite the beach, they leaped overboard to the reefs and could be observed deliberately winding their various explosives around the obstacles. Later, withdrawing to a safe distance, they would set off their explosives with such effect that a veritable sheet of flame and water shot up from the location of the obstacle. When this commotion subsided, there remained little of the obstacles except debris. Accompanying these parties were usually a few picked intelligence men from the assault troops whose object was to gain first-hand information of the landing beaches. These were the final preliminary preparations before the actual landing.

It will be seen from Map No. 1 that there were two landings made simultaneously. One, made by the First Provisional Marine Brigade, landed on a front of about 2,000 yards between the village of Agat and Bangi Point. The immediate objective of this landing was the commanding ground of Mt. Alifan, plus sufficient space for the maneuver of the corps artillery and other troops. The other landing was made by the Third Marine Division in Agana Bay. The immediate objective of this landing was the seizure of the heights dominating the beach, the capture of the Navy Yard at Piti, and the seizure of Cabras Island. These two pincers threatened the Japanese garrison on the Orote Peninsula so effectively that some of the crack Japanese units from Manchuria, defending in the Tenjo area, quickly withdrew to the eastward, as did a certain number of naval people on Orote itself, although the major portion of the latter garrison stayed to die defending their posts. This also may be considered a classical feature in the Guam operation. It proved the advantage of making more than a single landing, as it served to confuse the Japanese to the point where their calculations for defense were very badly upset.

The 77th Army Division was landed early in the game, after the First Marine Divisional Brigade, so that the latter could be released and used for the assault against the Orote Peninsula, which had to be taken to consolidate the force beachhead. Patrols from this division were very active and effective, and it was soon discovered that the dominating peak on the island, Mt. Tenjo, had been abandoned by the Japanese. The peak was quickly seized, thus giving us the advantage of its observation facilities and denying them to the enemy. By this time the corps artillery had been landed and emplaced, and the corps artillery commander was charged with the control and coordination of all fires of whatsoever nature. Shortly thereafter, forces from the northern landing and those from the southern landing joined hands and the force beachhead was complete save only for Orote Peninsula. This peninsula, upon which was situated the one operating airfield, proved to be a veritable fortress, honey-combed with caves in which the garrison had weathered an inconceivable amount of fire from ships, airplanes and land artillery. There was nothing to do but to make a frontal assault from the mainland up to Orote Point and this assault was made by the First Provisonal Marine Brigade supported by practically all the land artillery, ships' guns and airplanes available. After several days of continuous assault the peninsula was cleared and the airfield came into our possession, thus, permitting our artillery


Map No. 1
Island of
GUAM
LANDING BEACHES 3D MARINE DIVISION
Agana Bay
AGANA
Santa Rosa Peak (861)
Mt. Barrigada (674)
Cobras Is.
PITI
LANDING BEACHES 1ST (PROV) MARINE BRIGADE
Orote Peninsula
Mt. Tenjo (1010)
AGAT
Mt. Alifan (800)

observation planes to land and begin shore operations.

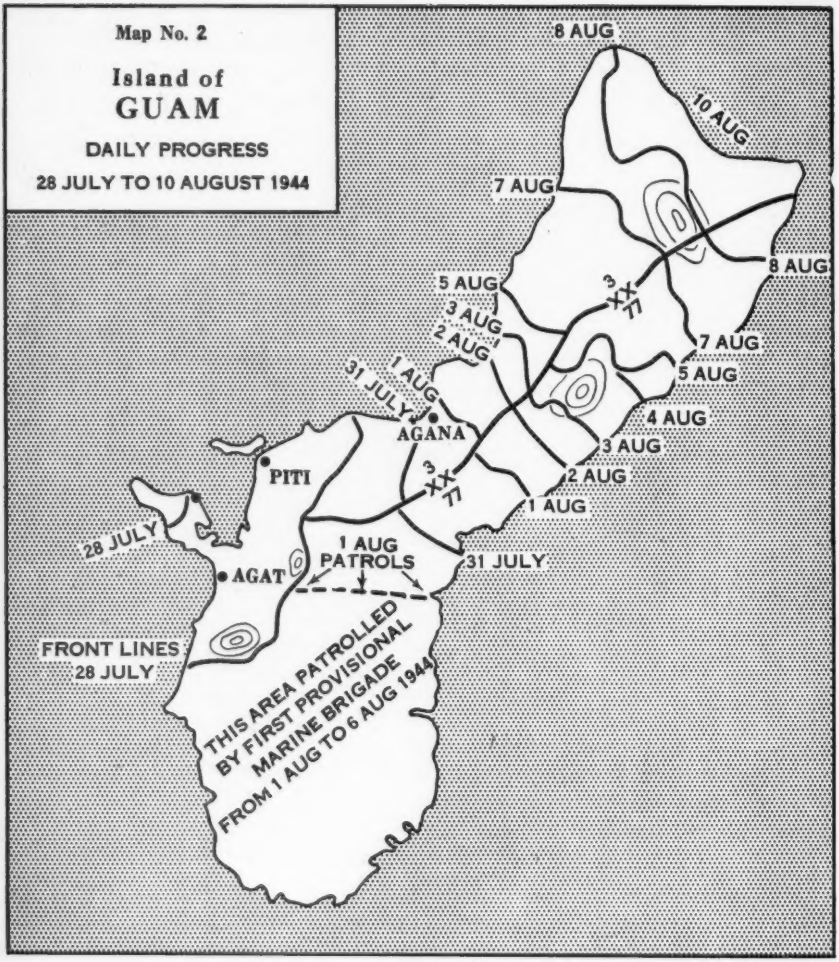
The seizure of the Orote Peninsula consolidated the force beachhead as conceived in the original plan and put us in a position to pursue the enemy forces wherever they might be. It was soon determined by patrols, aerial observation and other means that the bulk of the enemy had headed northeast. Hence, the plans were laid to attack along the Northeast Peninsula with the Third Marine Division on the left and the 77th Army Division on the right (Map No. 2), supported by the bulk of the fire support available. The First Provisional Marine Brigade while in reserve patrolled the area to the south to insure that no large force of the enemy remained there to interfere with the main operation.

Eventually the First Provisional Marine Brigade was added to the forces making the attack along the Northeast Peninsula. This operation completed, the Corps Commander on 10 August 1944 declared all organized resistance at an end. Thus, in a campaign lasting twenty-one days, an area of 225 square miles had been wrested from a tenacious enemy, who continued for a long time thereafter to hide in caves and pursue guerrilla warfare against the conquerors.

To sum up the features which made the Guam operation a classic:

(a) The target was a heavily defended island, held by the enemy with great tenacity because of its strategic importance. From its airfields went our air spearheads toward Iwo and to Japan it-

Orote Peninsula showing airstrip. (U.S. Marine Corps photo.)


Map No. 2
Island of
GUAM
DAILY PROGRESS
28 JULY TO 10 AUGUST 1944
8 AUG
10 AUG
7 AUG
8 AUG
5 AUG
3 AUG
2 AUG
1 AUG
31 JULY
3 XX 77
7 AUG
5 AUG
4 AUG
3 AUG
2 AUG
1 AUG
AGANA
PITI
28 JULY
AGAT
1 AUG PATROLS
31 JULY
FRONT LINES 28 JULY
THIS AREA PATROLLED BY FIRST PROVISIONAL MARINE BRIGADE FROM 1 AUG TO 6 AUG 1944

Clearing out a Jap cave on Guam. (U.S. Marine Corps photo.)

self. Its capture was essential in the strategic plan.

(b) The enemy disputed sea and air control of the theater and had to be decisively beaten at sea and in the air before the landing operations could proceed securely. The behavior of the Fleet Commander in this instance was correct in sticking to his mission of covering the operation.

(c) The harmony which existed among the naval, marine and army leaders was exemplary. Unity of command was there, and it must of necessity be so. But in addition there was that which mere command will seldom obtain, a hearty and wholesome unity of spirit which seemed to say: "This is an American force engaged in defeating an enemy. We have subordinated any thoughts of personal or 'unit' glory to the task in hand." Such maturity of thought and action must be recorded as classical.

(d) The coordination of fires, sea, air and land artillery were exemplary throughout. The methods and techniques employed were effective beyond anything that ever went before. "Come in Closer" Conolly taught the world a lesson in ship's fire support that it will be well never to forget. The abundance of air fires furnished by Mitscher's squadrons,

and finally the close liaison on board the flagship of all those who conducted fire-power were classical. Priorities were made to suit the needs of the troops who were to assault, with a consequent systematic wrecking of the enemy's coastal defense artillery, his beach defenses, his command posts and his communications, the searching out of his field artillery and mortars, and the virtual paralyzation of his fire power. These things cannot be done in a day. At Guam it took two weeks of steady bombardment, both day and night. There was an abundance of ammunition, it being but a short haul to replenish at the anchorage off Saipan.

(e) A landing on two fronts, simultaneously, has enormous advantages over a single landing. It throws the enemy off balance because he has to guess which one is the main effort. It will sometimes lead to a pinching off of a part of his defenses. With a floating reserve actually prepared to land in exploitation of success upon either beach, we have the classical combination. In Guam all these things came about as the result of the double landing. There was great temptation, because of terrain difficulties, to cancel the northern landing. This would have been a costly error.

(f) The employment of fresh troops in the continuation of the attack after the seizure of the beachhead, in this case the 77th Division, was responsible for the speed and efficiency with which Phase Two was accomplished. Tired, bedraggled, haggard infantry who have suffered a long, confining sea voyage, followed by a landing assault, with more rough and tumble fighting to secure their beachhead are in no shape to pursue, or to continue an attack. The classical requirement should be that a floating reserve be present to take over this phase of the attack, especially where the land mass is considerable, as it was on Guam.

Future students of amphibious warfare may find in the Guam operation the answers to a great many vexing questions. It is not probable that future operations will ever be quite like those in which we participated during the recent war. Yet some of the principles will be there. War is fire and movement, and we cannot escape from these two elements in our future calculations. What manner of fire power will be provided by atom bombs, guided missiles, more effective rockets, etc., is not yet clear to the student of war. But whatever its form, it will still be fire power, and upon its effectiveness will depend the success of the second inescapable factor: movement, as represented by the assaulting infantry. Again we may develop sea and aircraft of very different design for the transportation of the infantry to the shore they are to attack. Yet the principles will still be there, and the most rapid deployment will still be the best means of reaching the shore with a minimum of losses. To the student who must solve the complex problems of these future landing attacks, there will be invaluable material on which to base his studies in the operations for the capture of Guam, a classical example which should provide a springboard for the evolution of this particular phase of the art of war.

A Review of
Military Government in Germany

Colonel William Whipple, Jr., *General Staff Corps*
Secretary General, Office of Military Government for Germany (U.S.)

The Early Phases

IN the fall of 1944, towards the end of the offensive which liberated France and Belgium, a busy staff officer in supreme Headquarters at Versailles received a phone call from Twelfth Army Group. The caller, whose name he failed to catch, demanded politely but insistently to know when the various SHAEF memoranda and Post Hostilities Handbooks on the German occupation would be available. The SHAEF officer said rather impatiently that there had been delays in finishing these documents; he thought some of them would be ready next month. "After all," he added, "There is still some time before we occupy Germany and we are pretty busy here in SHAEF." "Young man," (the story goes), "this is General Bradley speaking, and my troops are in Germany now!" Whether or not the story is literally true, it was about that time that realization finally spread that the operational period would soon end, leaving problems for which staffs were not prepared.

During the next few months of the operation, prior to crossing the Rhine, governing parts of western Germany were minor annoyances handled largely by army rear echelons. Finally, the rushing twin offensives, encircling the Ruhr and the subsequent southern drive ending suddenly with the surrender, 8 May 1945, left all Germany the responsibility of the occupying armies.

Conditions in Germany in May 1945 were in some respects much more favorable than had been feared. The German people were absolutely paralyzed by the overwhelming military power of the Allies and the collapse of Nazi officialdom. The sporadic resistance of fanatics which had been forecast was almost non-existent—the German people were fearful, cooperative or apathetic, but practically all were submissive and obedient. The immediate economic problems, however, including the complete disruption of transport, communications and industry, were fully as bad as had been anticipated.

Military Government staffs in Germany had been attached to field armies and moved into Germany as the armies moved, although, when practicable, personnel governing a given locality would be transferred when the army boundaries shifted to avoid moving them. This procedure worked as well as could have been expected. The primary mission of military government staffs at first was to keep the population quiet and orderly and out of the way of the operational part of the army while some of the more urgent immediate missions were attended to.

Immediate Tasks

First, Allied prisoners of war had to be liberated and cared for, and the pathetic prisoners of the concentration camps given immediate relief. These operations were conducted with enthusiasm by all concerned.

Next, the armies themselves had to shift. U.S. Armies had entered Germany on a tremendous front starting north of the Ruhr, and initially occupied not only practically all of the future U.S. Zone (except Stuttgart) but greater areas of the British, Soviet and French Zones. Of the four U.S. Armies, the Third and Seventh were to remain, initially. By August the occupying powers had shifted their forces and readjusted to the zones of occupation as agreed.

Meanwhile, the return of great numbers of displaced persons and refugees was beginning. During the war, millions of Poles, Russians, French and other nationalities had been brought to Germany. There were roughly three million such persons in the U.S. Zone alone. The return of these people to their native lands was a prerequisite to the return of Germany to normalcy, since they could neither be left subjected to German authority nor amalgamated to the Germans. Figure 1 shows numbers of persons repatriated in the first ten months of the occupation and will give some indication of the political, economic and administrative problems involved in this task. This is exclusive of Germans who were refugees within Germany from their proper homes and Germans expelled from other areas such as the Sudetenland.

The administration of captured and disarmed enemy forces was an immediate problem of great magnitude for the army. By 31 July 1946, in round numbers 2,000,000 had been disarmed and discharged, 900,000 had been transferred, and 1,800,000 remained in U.S. custody.

During the initial period, high priority was given to rounding up the scattered portions of Reichs governmental organizations which had dispersed throughout Germany during the closing months of the war. Government officials and records alike were assembled for exploitation by special teams. Prominent Nazis were also summarily arrested to the number of 80,000 in the first three months.

U.S. Policy

Until August 1945, American policies regarding the occupation of Germany were substantially similar to British policies, and had been embodied very largely in the SHAEF Post Hostilities Plans and Memoranda which were binding upon U.S., British and French forces during the period of combined command, ending in July.

During July, the Potsdam Agreement was negotiated between the U.S., U.K. and U.S.S.R. governments. This agreement confirmed most of the principles upon which American military government had been operating. It provided for the liquidation of Nazi and militaristic elements in Germany, the bringing of war criminals to justice, the removal of more than nominal Nazis from public office and from important private positions, the complete disarmament of Germany and control of her industry sufficiently to insure occupation objectives, the decentralization of the German political structure and monopolistic economy and the control of German external assets. Agreements were reached on reparations and export policy, on central German administrative departments, and finally on two points of paramount importance: First, that Germany would be treated as an economic unit and, second, that "the German people (should) be given the opportunity to prepare for the eventual reconstruction of their life on a democratic and peaceful basis."

The above was certainly highly satisfactory, especially in view of the virtually complete lack of information which existed as to the Soviet occupation of their zone.

There were, however, two points in connection with the agreement which deserve particular notice. One was the fact that the French had not participated in its

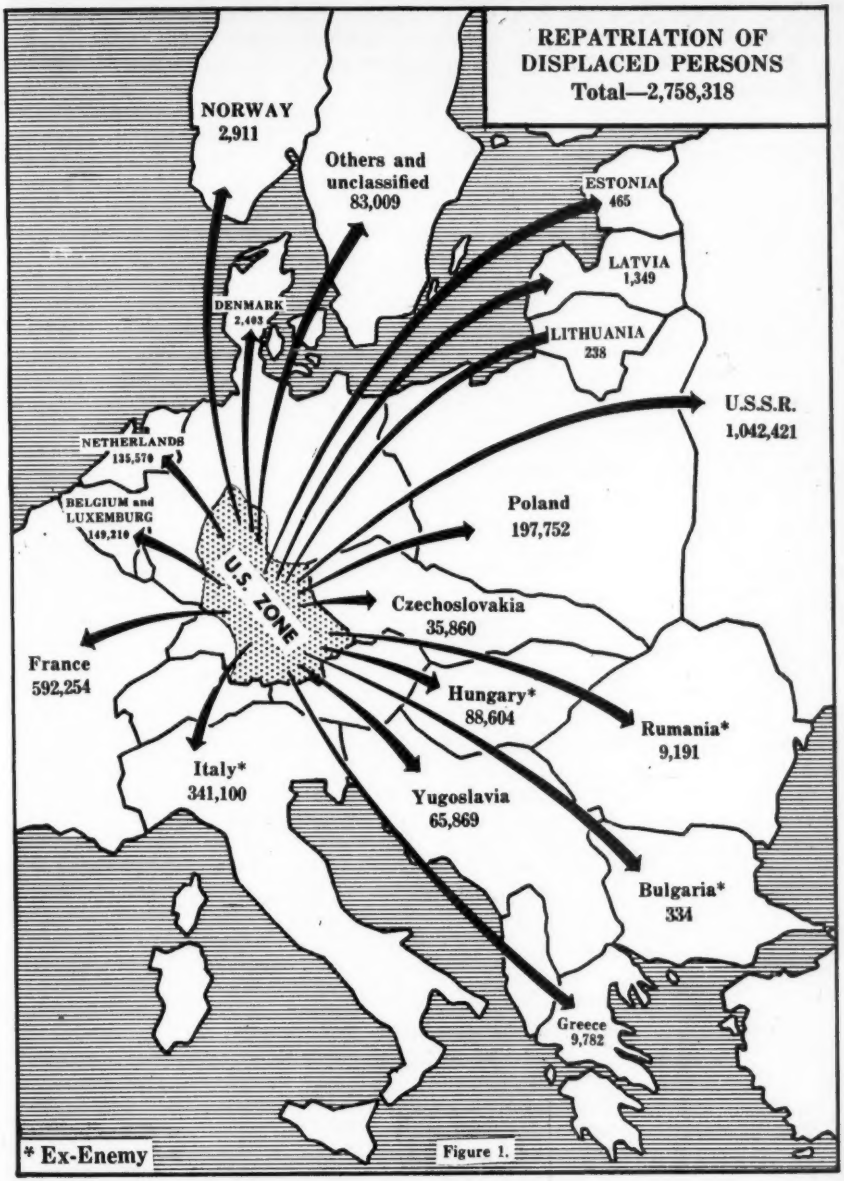

REPATRIATION OF DISPLACED PERSONS
Total—2,758,318
NORWAY 2,911
Others and unclassified 83,009
ESTONIA 465
LATVIA 1,349
LITHUANIA 238
DENMARK 2,403
U.S.S.R. 1,042,421
NETHERLANDS 135,570
BELGIUM and LUXEMBURG 149,210
Poland 197,752
U.S. ZONE
Czechoslovakia 35,860
France 592,254
Hungary* 88,604
Rumania* 9,191
Italy* 341,100
Yugoslavia 65,869
Bulgaria* 334
Greece 9,782
* Ex-Enemy

Figure 1.

negotiation and their attitude towards it could not be forecast. The other was the provision that the major portion of Germany east of the Oder and Neisse Rivers was to be administered by Poland.

German Governmental Organization

Meanwhile the revival of necessary German administrative machinery was a complex problem which could not wait. On the local level it was fairly simple, since many of the local officials were not Nazis and had remained at their posts. The Reichs government, however, had for all practical purposes ceased to exist. Since such officials and records of the central government as were found were rounded up and not allowed to function. The Weimar Germany had been divided up into states or *Laender*, but during the Nazi regime a different and overlapping territorial unit, the *Gau*, had been created, along party lines, which had usurped many provincial functions of government and which was, of course, highly Nazi as to personnel. Even in the *Laender*, many of the most competent officials had Nazi records such that they had to be replaced. The situation was also complicated by the fact that zone boundaries had been dictated by negotiations on an Allied political and military basis and did not follow boundaries of German governmental subdivisions. For example, the well defined states of Württemberg and Baden each lay half in the French Zone, half in the U.S. Zone. By the end of July 1945 a fairly substantial *Land* government had been reestablished in Bavaria and rudimentary *Land* governments had been created at Stuttgart (for parts of Baden and Württemberg), at Darmstadt (for Hessen-Nassau), and at Marburg (for Hesse). A few months later the two last named were combined into the *Land* Grosse Hessen with capital at Wiesbaden, leaving three *Laender* or provinces for the U.S. occupation zone, controlling most governmental functions except railroads, water transport and postal and telecommunications, which remained centralized under army control for some time longer. It proved difficult to find sufficient experienced civil servants and officials not implicated in Nazi party activities, but when found they were efficient, and tractable, and very appreciative of the treatment given them. The nominated *Laender* governments proved very successful and were entrusted with more responsible tasks as time went by. See Figure 2 for map of the U.S. Zone showing the *Laender* and Offices of Military Government as they ultimately developed.

Problems of Redeployment

During the fall of 1945 the U.S. Army in Europe, including Military Government, became involved in the truly appalling administrative problems of redeployment. U.S. public opinion virtually demanded that the overseas army return by Christmas, regardless of logistical practicability. Moreover, the individual soldier and officer became infected with almost an obsession to get home. The utmost had to be done to accomplish the impossible in this respect, even at the expense of the mission in Europe. Military Government found suddenly that large numbers of enlisted men and officers, who had been selected and given specialized training in the United States, were asking for redeployment just as the occupation was getting well under way! They had mostly been brought overseas in early 1944, to be prepared for a possible early capitulation, or had been on other theater assignments, and had accumulated enough points to be eligible for return. These men, trained especially for the occupation, had succumbed to the common obsession to go home; they had the legal right to go and they were sent. They were replaced, first, by transfer of other available military personnel, and later, by civilians hastily recruited from the U.S.

International Boundaries
Zonal Boundaries
Land Capitals
Bremen Enclave (U.S.-Brit.)
OMG Bremen
Hamburg
BRITISH ZONE
Muenster
Hanover
Brunswick
U.S. Sector OMGUS
Berlin
OMG-Berlin District
Magdeburg
SOVIET ZONE
Kassel
Leipzig
Dresden
GREATER HESSE
WIESBADEN
FRANKFURT
USFET HDQS
OMG-GR HESSE
Nuremberg
CZECHOSLOVAKIA
FRENCH
WURTTEMBERG-BADEN
Regensburg
STUTTGART
OMG-W Baden
U. S. ZONE
BAVARIA
ZONE
MUNICH
OMG-BAVARIA
AUSTRIA

Figure 2.

U.S. Organizational Matters

Organizational problems of military government were very acute during 1945. During the SHAEF period, the SHAEF integrated staff had full responsibility for the planning, and for the current problems of the occupation. The G-5 Division of SHAEF was mainly responsible for governmental matters, but other general staff divisions had post-hostilities sections for the numerous matters of concern to them. Military Government field personnel were attached to Armies by G-5 as needed. The U.S. Group Control Council, which was set up as the nucleus of the U.S. control element for Germany, concerned itself mainly with preparatory planning and assisted the SHAEF staff when required, but initially had no direct link with it. When SHAEF was dissolved, its U.S. G-5 personnel became the G-5 of the new U.S. Theater Staff, which was operational, and the U.S. Group Control Council was prepared to go to Berlin. From this time on, the two staff elements, coordinated by the Deputy Military Governor, came into much closer contact.

In August, the U.S. Group Control Council assumed its duties in Berlin as the U.S. element of the quadripartite machinery of the Allied Control Authority. See Figure 3. Thereafter, close coordination became essential in the negotiation of quadripartite matters in Berlin and the zonal administration in Frankfurt.

Central German Agencies

As the autumn wore on it became apparent that the unified German administration was not developing as U.S. military government had hoped it would after the Potsdam Agreement. The French delegation refused (and still did in December 1946) to consider the establishment of any central German agencies as agreed at Potsdam, on the ground that the French Government had not participated in the agreement. This left no alternative but purely zonal administration, and made it extremely difficult to obtain the treatment of Germany as an economic unit, since in anticipation of central German agencies, no specific arrangements had been negotiated regarding relationships between zonal German agencies.

Economic Conditions

The general economic conditions of Germany meanwhile, were giving great concern. As will be recalled, there was, in the United States in 1945, a strong feeling that the German economy, which had supported the Nazi aggression, must be greatly weakened and de-industrialized. As it turned out, the results of the war and particularly Allied bombing had already more than accomplished that task. To quote from the first report of the Military Governor in August 1945: "Although it still possesses large material resources and latent powers of recuperation, shortages of available coal and food, and of transportation and communication facilities have brought the German economy, and particularly its industry, almost to a standstill. The present condition of this economy must be evaluated in the light of three definite policies: The necessity for demilitarization of German industry, the requirements for exports to pay for necessary imports, and the necessity for producing the minimum German civil requirements essential to prevent widespread starvation and disease. The German economy is for the time being thoroughly demilitarized, and, far from restraining resurgent German business, great efforts must be exerted to build up industrial, transport, and communications facilities, which are essential for the production of coal required in Western Europe, and for the provision of minimum food and other supplies."

The minimum requirements of the German economy of the U.S. Zone, especially for food and petroleum products, have continued to be beyond available resources and have resulted in continuous imports at U.S. expense ever since. The U.S. Zone

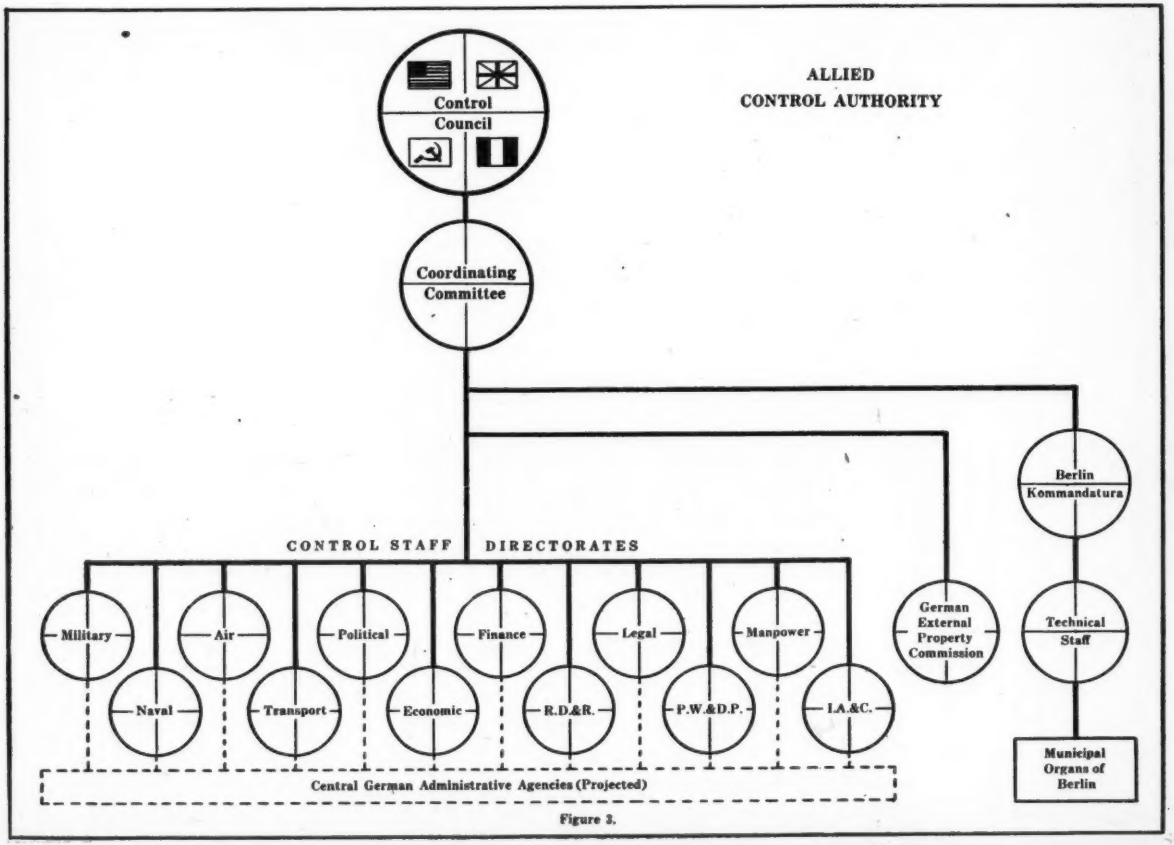

ALLIED
CONTROL AUTHORITY
Control Council
Coordinating Committee
Berlin Kommandatura
CONTROL STAFF
DIRECTORATES
Military
Air
Political
Finance
Legal
Manpower
German External Property Commission
Technical Staff
Naval
Transport
Economic
R.D.&R.
P.W.&D.P.
I.A.&C.
Central German Administrative Agencies (Projected)
Municipal Organs of Berlin

Figure 3.

was never self-sufficient in food even in years when it imported adequate supplies of fertilizers. Another important reason for food deficiency has been the presence in the U.S. Zone of enormous numbers of refugees and expellees from other zones of Germany and from areas outside of Germany's present boundaries. Partly due to the failure to treat Germany as an economic unit, it has not yet been possible to build up exports from the U.S. Zone sufficient to pay for minimum essential imports.

The *Laenderrat*

During the autumn a better means of coordinating the three German *Laender* Governments of the U.S. Zone was developed. The Three Minister Presidents were assembled in an advisory, coordinating and consultative body known as the *Laenderrat*, to meet periodically at Stuttgart, and agree, with unanimous consent, on common action or recommendations. To this body were added various subordinate committees and agencies, which with the further development of the *Laender* Governments, soon relieved Military Government of many detailed duties. This relief was very welcome, both on policy grounds and also because redeployment was taking so many trained U.S. personnel.

Unification of Military Government

During the winter of 1945-46 there was a gradual unification of Military Government staffs and a separation from the purely military echelons. In one step, U.S. Group Control Council became the Office of Military Government for Germany (U.S.) and Theater Headquarters G-5 became the Office of Military Government (U.S. Zone). On 1 January 1946, the Offices of Military Government of the three *Laender* were taken from the staffs of the field armies and thereafter controlled entirely through Military Government channels. Finally on 1 April 1946 the Office of Military Government (U.S. Zone) ceased to exist, and the staffs responsible for zonal administration of military government were consolidated in Berlin with those responsible for quadripartite negotiations. The unified relationships then instituted are illustrated in Figures 4 and 5. Division Directors from this time on were responsible both for quadripartite negotiations in the Allied Control Authority Directorates (see Figure 3), and for zonal administration and implementation both through command channels and through the functional channels which most of them had with corresponding staff elements in the five main field offices of Military Government.

For organization of German government within one of the *Laender* at that time see Figure 6.

It might be noted that none of the other three occupying powers solved their organizational problems in just the same manner. The Soviet zonal military headquarters are in Babelsberg, outside but adjacent to Berlin, and their Military Government headquarters is in their sector of Berlin. The British zonal staffs were mostly in the British zone, with the Berlin staff operating initially as an advance echelon. The French zonal Military Government at Baden-Baden is remote from Berlin and has no direct connection.

The Allied Control Authority Building is occupied continuously only by the four national elements of the Allied Secretariat; and the Allied Directorates, with their many committees, sub-committees and working parties meet as needed but do not sit continuously. However, there are hundreds of individuals daily engaged in quadripartite negotiations, and observers are usually surprised at the intensive activity and the pleasant individual relationships which exist even in subjects deadlocked on account of policy disagreements. The mechanics of language and other difficulties of quadripartite negotia-

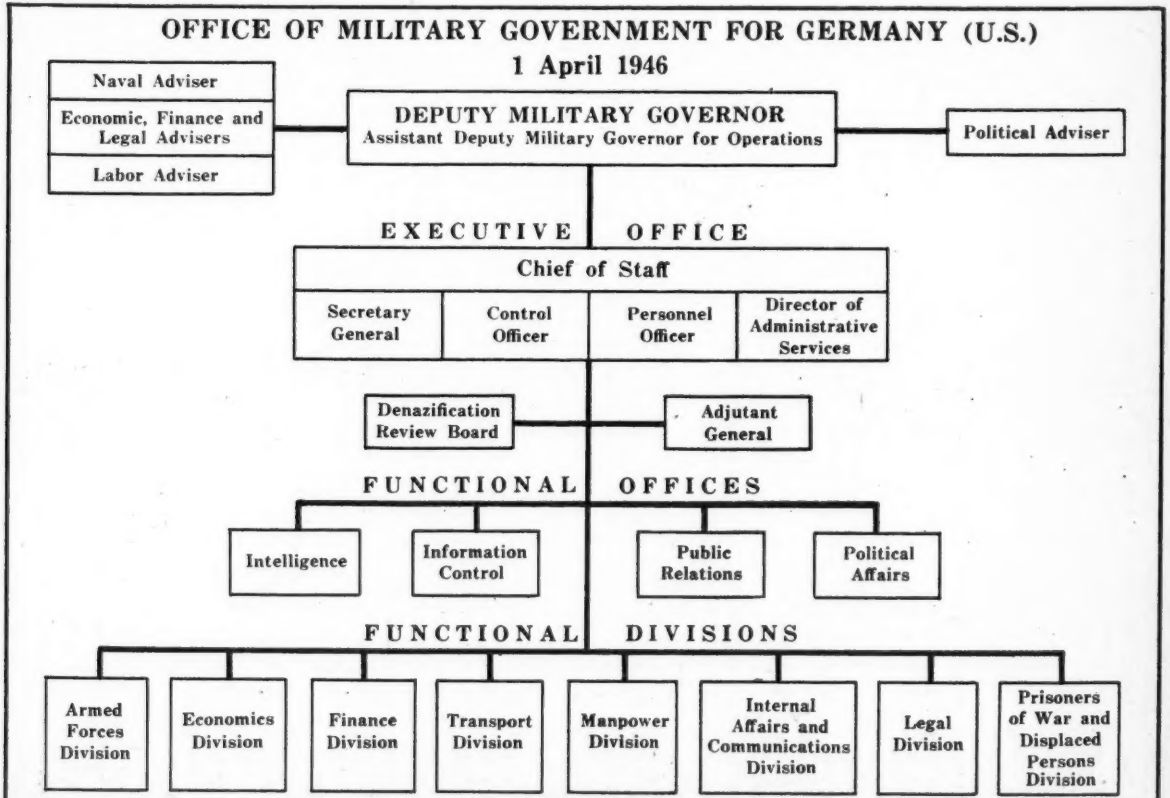

OFFICE OF MILITARY GOVERNMENT FOR GERMANY (U.S.)
1 April 1946
Naval Adviser
Economic, Finance and Legal Advisers
Labor Adviser
DEPUTY MILITARY GOVERNOR
Assistant Deputy Military Governor for Operations
Political Adviser
EXECUTIVE OFFICE
Chief of Staff
Secretary General
Control Officer
Personnel Officer
Director of Administrative Services
Denazification Review Board
Adjutant General
FUNCTIONAL OFFICES
Intelligence
Information Control
Public Relations
Political Affairs
FUNCTIONAL DIVISIONS
Armed Forces Division
Economics Division
Finance Division
Transport Division
Manpower Division
Internal Affairs and Communications Division
Legal Division
Prisoners of War and Displaced Persons Division

Figure 4.

tions have been substantially overcome; and the quadripartite joke, with each delegation laughing after the appropriate interpreter speaks, has long been commonplace.

Liaison and Security Offices

In the field it was originally necessary to have wide dispersion of small operational military government staffs, each fully responsible for a given area. As German *Laender* governments were reconstituted and developed this system became obsolete. Finally, at all levels below the *Land*, over 200 "Liaison and Security Offices" were organized, which were mostly of two officers and two enlisted men each, except in larger population centers. These offices remained operational for certain purposes of denazification and public safety, but in all other matters functional control has since been exercised only at *Land* level or above, except in emergencies.

Conversion of U.S. Personnel to Civilian Status

It was initially anticipated that the Army would be relieved of responsibility for Military Government during the summer of 1946 and that a civilian agency would assume this responsibility. This was one main reason for the separation of military government staffs and functions from the military troops and operational administration described above. For the same reason, it was decided to convert personnel to civilian status. This created many administrative difficulties, particularly in view of the lack of precedent in the classification of some of the positions in fields such as denazification, which do not correspond to anything in U.S. government. Many officers and enlisted men, with appropriate background and experience, had their status changed in the theater. Others were recruited in the United States. By the end of summer the change to civilian status had reached, and was stabilized at, the target ration of two-thirds of functional staffs. Certain administrative elements and the Liaison and Security Offices remain entirely military. The reduction of staffs at all levels, concurrent with the reduction of operational duties, still continues, but civilian ratios of personnel now continue substantially unchanged.

Revival of German Democracy

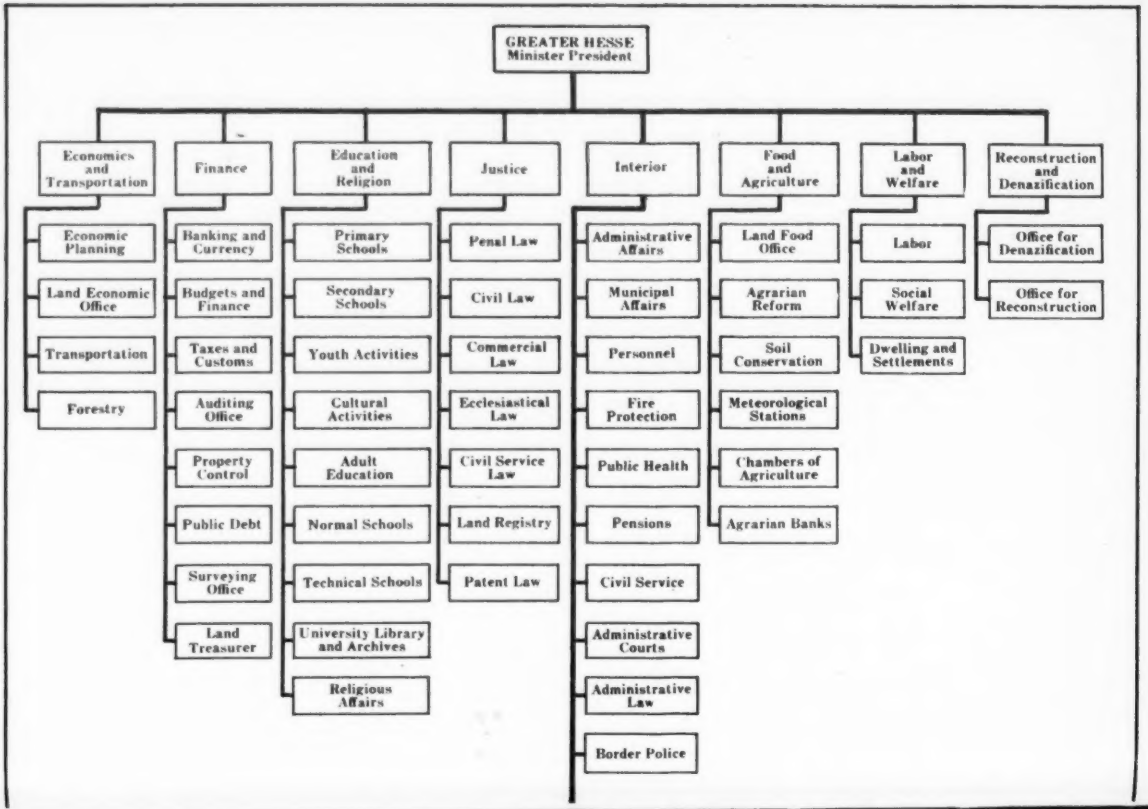
The year 1946 has been marked in the U.S. Zone by a revival of democratic processes in German government. In this we have lead the other three powers. In January the first elections were held on a purely local basis. Despite dire predictions of those who believed that thirteen years of Nazis domination had destroyed whatever democratic elements had ever existed in Germany, the people took considerable interest, and the elections were a decided success. As the months went on, other local elections were held, and political parties encouraged to develop. On 30 June, delegates were chosen to Constitutional Assemblies for the three *Laender*, and the assemblies were allowed to complete their work with little Allied influence. The completed constitutions were approved, with few modifications, ratified by referendums, elections were held under them, and now all three *Laender* have duly elected constitutional governments of their own choosing. In no other zone has progress been comparable towards the rebuilding of democratic institutions in Germany.

Denazification

In the field of denazification, developments have been so important that this field deserves special mention. During the early months of Military Government, denazification was always a hotly debatable field. It was accomplished by military government "Special Branch" (Public Safety) detachments, with the assistance of

MILITARY GOVERNMENT RELATIONSHIPS
Effective 1 April 1946
MILITARY GOVERNOR
is also Theater Commander
DEPUTY
MILITARY GOVERNOR
HEADQUARTERS
OFFICE OF MILITARY GOVERNMENT
FOR GERMANY (U.S.)
Rear Echelons
Special Agencies
and Field Units
Office of Military
Government for
BAVARIA
Office of Military
Government for
WUERTTEMBERG-BADEN
Office of Military
Government for
GREATER HESSE
Office of Military
Government for
BREMEN
Office of Military
Government for
BERLIN DISTRICT
LIAISON AND SECURITY OFFICES
AT KREIS LEVEL
Regional Government
Coordinating Office

Figure 5.


GREATER HESSE
Minister President
Economics and Transportation
Economic Planning
Land Economic Office
Transportation
Forestry
Finance
Banking and Currency
Budgets and Finance
Taxes and Customs
Auditing Office
Property Control
Public Debt
Surveying Office
Land Treasurer
Education and Religion
Primary Schools
Secondary Schools
Youth Activities
Cultural Activities
Adult Education
Normal Schools
Technical Schools
University Library and Archives
Religious Affairs
Justice
Penal Law
Civil Law
Commercial Law
Ecclesiastical Law
Civil Service Law
Land Registry
Patent Law
Interior
Administrative Affairs
Municipal Affairs
Personnel
Fire Protection
Public Health
Pensions
Civil Service
Administrative Courts
Administrative Law
Border Police
Food and Agriculture
Land Food Office
Agrarian Reform
Soil Conservation
Meteorological Stations
Chambers of Agriculture
Agrarian Banks
Labor and Welfare
Labor
Social Welfare
Dwelling and Settlements
Reconstruction and Denazification
Office for Denazification
Office for Reconstruction

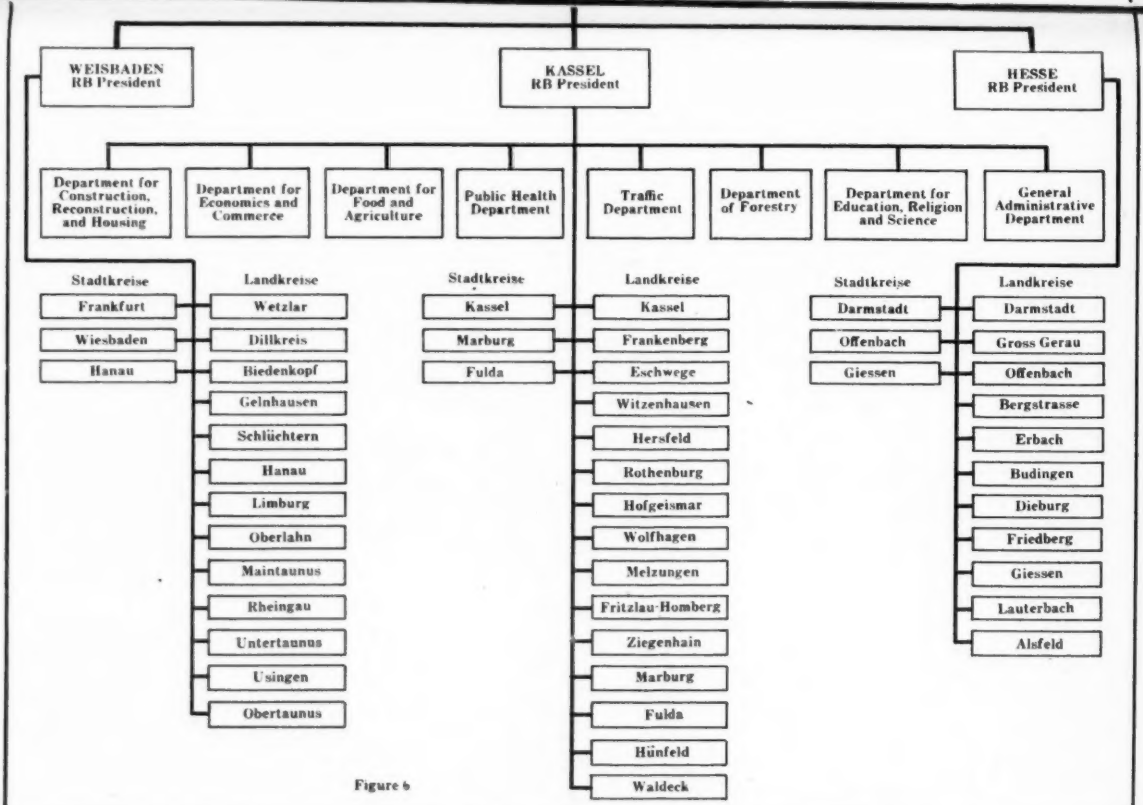

WEISBADEN
RB President
KASSEL
RB President
HESSE
RB President
Department for Construction, Reconstruction, and Housing
Department for Economics and Commerce
Department for Food and Agriculture
Public Health Department
Traffic Department
Department of Forestry
Department for Education, Religion and Science
General Administrative Department
Stadtkreise
Frankfurt
Wiesbaden
Hanau
Landkreise
Wetzlar
Dillkreis
Biedenkopf
Gelnhausen
Schlüchtern
Hanau
Limburg
Oberlahn
Maintaunus
Rheingau
Untertaunus
Usingen
Obertaunus
Stadtkreise
Kassel
Marburg
Fulda
Landkreise
Kassel
Frankenberg
Eschwege
Witzenhausen
Hersfeld
Rothenburg
Hofgeismar
Wolfhagen
Melzungen
Fritzlau-Homberg
Ziegenhain
Marburg
Fulda
Hünfeld
Waldeck
Stadtkreise
Darmstadt
Offenbach
Giessen
Landkreise
Darmstadt
Gross Gerau
Offenbach
Bergstrasse
Erbach
Budingen
Dieburg
Friedberg
Giessen
Lauterbach
Alsfeld

Figure 6

other functional staffs. The German being screened was required to fill out a special questionnaire or *fragebogen*, which was checked from all other available information. Depending largely on rules regarding the date he joined the Nazi party and his position and activities in it, the individual was classified as "mandatory removal," "discretionary removal," or as "no evidence of Nazi activity."

Special Branch personnel were limited in number, and they acted on over a million individual cases in nine months, so that it is quite evident that a full investigation and lengthy consideration of fine points was impossible. Rough justice, however, was the rule. Under this procedure, up to 28 February 1946, there were denied or removed from office 167,512 Nazis in governmental positions, 81,939 Nazis in business and industry, and 47,544 in other fields.

There were great difficulties in applying this program in early months. It always seemed to develop that the invaluable *burgomeister* or the indispensable engineer who alone could run the water-works, was declared a "mandatory removal." Then usually the victim and his friends emotionally proclaimed (and in a few cases it was true) that he really disliked the Nazi party and opposed it when he could, but had to join in order to keep out of a concentration camp. Often military government functional experts would strongly advocate the retention of individuals or groups of Nazis on the grounds that that particular function would otherwise face disaster. However, the basic policy was that denazification was a MUST. The last major field to be completed was rail transport, which was so important to redeployment that it was held until last. Finally rail officials were put through the same rigid process, and despite a few pessimistic predictions, the resultant wholesale dismissals had no really serious effect.

It was realized, however, that the U.S. phase of denazification was very incomplete. All that had been done was to remove these individuals from certain positions. Outside of the few prominent men on trial at Nuremberg, the Nazis had not been punished for their participation in party activity, nor had those of them who grew rich through the Nazi party been deprived of their gains. Moreover, procedures adopted were necessarily rough and rather arbitrary.

It was decided that a really complete program of denazification should be undertaken by the Germans themselves. Accordingly, the *Laenderrat* was called on to prepare the law, which is called "Law of Political Liberation." Ministers of Political Liberation were appointed in each *Land*. By the end of June, 316 German tribunals were in operation, trying Nazis for the crime against Germany which their party activities constituted. The program is immense in scope, due to the number of people who must be tried, and politically difficult for Germans themselves to enforce. It is the most arduous responsibility of the *Laender* governments, and requires close supervision by Military Government.

Level of Industry Plan and Reparations

During the winter of 1945-46 a level of Industry Plan was agreed upon, which represented the industrial levels of production and of plant capacity which would be allowed in Germany. These levels were calculated so that Germany could become economically self-supporting under conditions of economic unity, under the Potsdam Agreement. Also, in compliance with that agreement, industries were surveyed, and plant capacity over that allowed in the Western Zones under the Level of Industry Plan was evaluated, declared available, and allocated for reparations, part to the Western nations, and part to the U.S.S.R. Considerable shipments of equipment have been made. However, it gradually became apparent that other parts of the

Potsdam Agreement would not be implemented in the immediate future, and that there was no assurance that the economic unity of Germany could be brought about. Under these conditions, with separate zonal administration of the four truncated portions of Germany, the production capacities allowed for retention in the Level of Industry Plan would not be sufficient to support Germany. Therefore, pending a clarification as to the fulfillment of the Potsdam Agreements as a whole, the allocation of additional plants for reparations was suspended, although shipment was continued of the plants already allocated.

Restatement of American Policy

Secretary of State Byrnes' Stuttgart speech in September reaffirmed the basic principles of American policy towards Germany. In addition he recognized the specific situation in which the failure to achieve the economic unification of Germany has jeopardized the success of the quadripartite occupation and nullified the Level of Industry Plan. Accordingly he confirmed the plan to effect an economic merger with any of the other zones of Germany.

Bizonal Merger with British Zone

In August 1946 agreement was reached, subject to governmental approval, to effect an economic merger of the U.S. and British Zones, and to create German bizonal executive agencies in the fields of economics, finance, food and agriculture, transport, and communications. For each of these agencies, which are located at various points in the two zones, a U.S.-British Control Group is located at the agency itself, and a U.S.-British Bipartite Committee is formed by the respective heads of that field, meeting in Berlin. Top-level matters are settled by the two Deputy Military Governors meeting in Berlin, as the Bipartite Board. Effective 1 January 1947, the German agencies will administer economic matters uniformly for the two zones, for the joint benefit of both. These arrangements for the two zones are very similar to those envisaged at Potsdam for all four zones, and are open to the Soviets and French to join at any time on an equal basis.

The coordination between the democratically elected *Land* governments in the U.S. Zone with the bizonal agencies is simple, but is expected to work effectively. Each German executive agency operates under a German Executive Committee of six members who act somewhat like a Board of Directors. The three appointments to each Executive Committee from the U.S. Zone are *ex officio* the respective ministers of that function in the *Land* Governments. Therefore, the *Land* governments, which are democratically elected, will exercise the maximum influence over the bizonal executive agencies which it is possible to give them at this time.

Potsdam and the Future

The Military Government of Germany is an historic mission and the U.S. Army may well be proud of the part it has played in meeting such unusual and important tasks. The occupation has not, so far, carried out all of the objectives and policies of Potsdam for all Germany, but it has carried out some of them for all Germany, others on a two or three power basis, and still others unilaterally in the U.S. Zone. The occupation of Germany by the army has been far from perfect; but no agency other than the army existed to do the job at all. In general, it may be said that the U.S. Zone in Germany has been firmly but fairly treated, that disease and unrest have been prevented, and that the re-establishment of a democratic form of government in our zone is proceeding on a healthy basis. The question whether or not the economic and political unification of all Germany can be effected upon a satisfactory basis in terms of U.S. policy is one that belongs to the future.

Signal Communications *in* Armored Divisions

Major H. W. Berry, *Signal Corps*
Instructor, Command and Staff College

SIGNAL Communications is the means by which a commander receives information and directs the action of his forces. Without communications a commander becomes ineffective because control is lost.

Although World War II produced many new methods of transmitting a message such as radio facsimile and radio relay, all methods are, at present, dependent on five basic means: radio, wire, messenger, sound, and visual. Each plays its part. However, the type of unit and the type of operation in most cases will dictate which of the various means may be employed.

The quickly changing situations and rapidity of movement of armored troops demand a fast, dependable and flexible communication system. It must operate over considerable distances and must require the minimum of time to establish. These demands necessitate the maximum use of radio, with a minimum of procedure and records. An armored division is provided with 1,170 radios to meet these demands.

Characteristic advantages of the use of radio in an armored division can be summed up as follows:

1. Radio is flexible:

a. It is not limited to any particular or fixed routes and can be varied to meet the rapidly changing tactical situations encountered by armored divisions.

b. Stations may be dropped out of the radio net or added at the will of the commander.

c. Communication is provided between moving headquarters.

2. From a command and staff viewpoint, armored division radios are simple to operate. Practically every set is especially designed so that a change can be made from one net to another by merely pushing a button or turning a switch.

Each means of communication has disadvantages and radio is no exception. Disregarding such things as mechanical and electrical failures, poorly trained operators, and improper maintenance:

1. Nets are limited by the number of radio channels. These channels are assigned by the next higher headquarters in such a manner as to make maximum use of those available. This, however, may affect the organization of the armored division for combat. In an infantry division this is not too difficult a problem, but it must be given full consideration in the tactical plans of an armored division. This is particularly true when an armored division is operating near other armored divisions or armored units.

2. A considerable amount of prior planning is necessary. As previously explained, the act of switching from one radio net to another is merely a matter of pushing a button or turning a switch, insofar as the operator is concerned.

This simple procedure, however, is no indication of the amount of prior planning that is necessary to make this possible. The signal plan, based on the tactical plan, must include adjustments of each and every radio set to make the above procedure possible.

3. Radio lacks secrecy. Signals can be heard by enemy radio stations that are within range, as well as by friendly stations for whom the signals are intended. Since the success of many armored operations depends to a great extent on the secrecy with which they are conducted, this characteristic must be kept constantly in mind. The lack of secrecy forces the use of codes or ciphers in radio communication, or may cause the commander to require radio silence when surprise is more important than the communication which they provide. Fortunately, due to the speed and mobility of an armored division, it is necessary to use only the more simple codes once the line of departure has been crossed.

Taking into consideration all these factors, it still remains that the disadvantages of radio in an armored division are more than offset by the characteristics of flexibility and mobility. Radio is the only one of the five means to have both characteristics, and therefore it must be considered as the principal means in an armored division.

Figure 1 shows the SCR-399 radio set which is the most powerful set used in the armored division. It is designed for long distance telegraph or voice transmissions. This set is provided to work with air headquarters, corps headquarters, adjacent divisions and with rear installations such as the rear echelon and the railhead. Figure 2 shows the two receivers for this set which may be kept in operation simultaneously, thus mak-

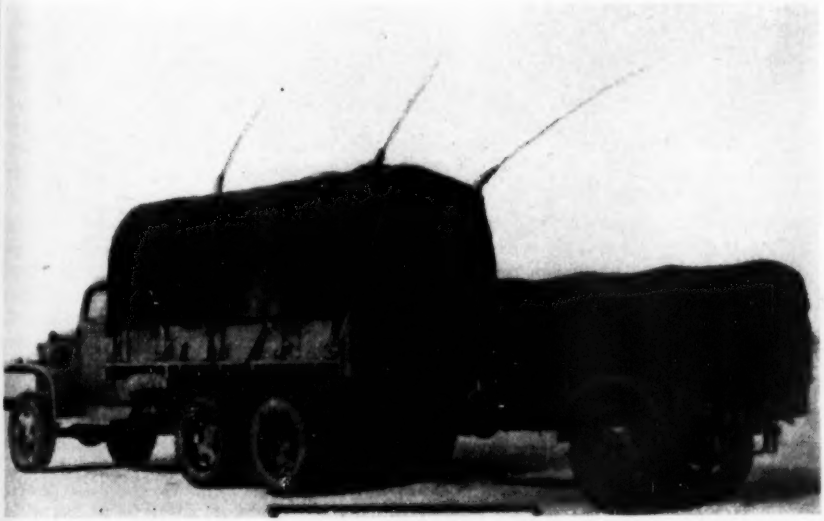


Figure 1.
SCR-399 in transport.

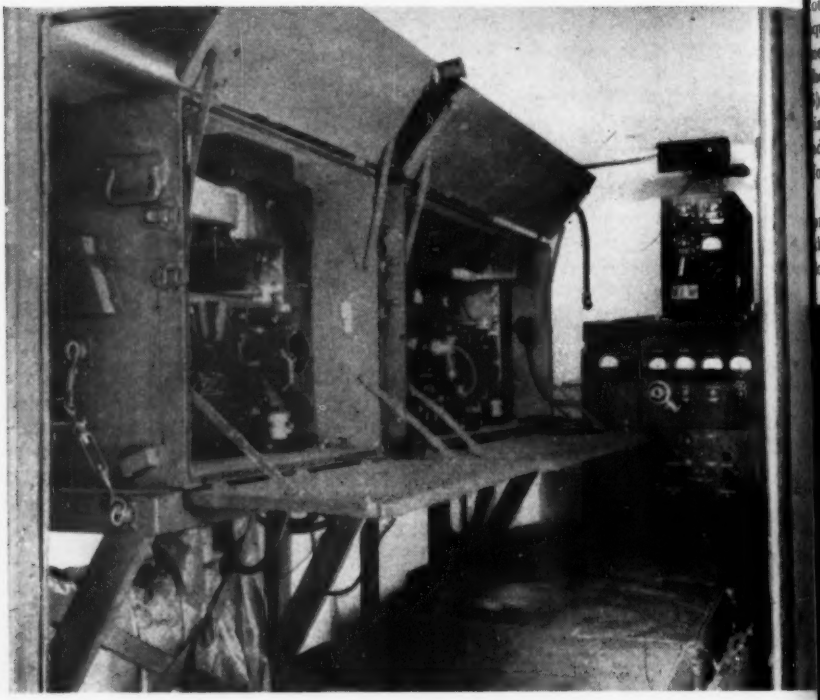


Figure 2.
SCR-399 ready for operation.

ing it possible for the station to "stand by" on two separate circuits. This feature is very valuable when additional contacts are needed.

The SCR 506 (Figure 3), is the standard medium range radio telegraph radio-telephone set for armored vehicles. It is used on all nets in battalion and higher headquarters and in the armored reconnaissance cars.

This equipment is specifically designed for rough treatment and cases of failure of its component parts are rare. One of the outstanding features of the design is a master switch permitting instantaneous change to any one of four pre-set frequencies, as well as a fifth channel which is manually operated over the frequencies assigned to ground units. This permits a battalion commander, for example, to have his transmitter channels pre-set for each of the combat command frequencies, as well as for the division command frequencies, so that no matter how the attachment of his unit is changed he is ready to report instantly to his new combat commander or to the division commander.

The SCR 528 (Figure 4), is the backbone of the division radio sets and is

found in every echelon. All tanks are equipped with this set as minimum equipment, and all commanders use it with the addition of another receiver (Figure). This set has a fine record of reliability, and if properly serviced and adjusted before an operation will perform with a high degree of efficiency. The transmitter and receiver are both pretuned to ten frequencies. Any one of these frequencies may be selected and locked in place by push-button selector switches, so that during combat, the company, battalion, combat command, artillery or other channels can be selected instantaneously as necessary. Internal connections are so arranged that all members of the tank crew can hear all transmissions, and can transmit in an emergency.

The normal range of this set is ten miles. However, a hill intervening between two stations may effectively prevent communication between them. On the other hand, all kinds of freak distance results have been recorded when the stations have been located on tops of hills with no intervening obstructions.

The SCR 508 (Figure 5), has exactly the same characteristics as the SCR 528 but it has, in addition, a second receiver. Both receivers can operate simultaneously and can be heard in a single headset. This feature permits one of the crew members to stand by for calls from two sources, and is of particular value to individuals such as tank battalion commanders, who may wish to interchange calls with two headquarters, such as the combat command at one time, and another headquarters, such as one of their companies, at approximately the same time.

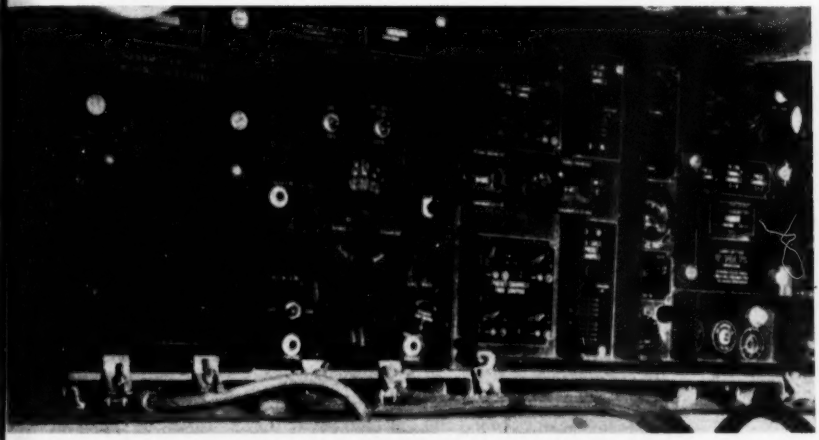


Figure 3.
SCR 506—Range: 70 miles, CW: 25 miles, voice

The SCR 510 (Figure 6), is a short range set and is found usually mounted in ¼-ton trucks and half-tracks. It is used principally for reconnaissance communication in light vehicles, and for short range communication in armored vehicles.

Two other short range sets, the

AN/VRC-3 and the SCR 536 complete the list of radios used within an armored division.

The vehicular mounted AN/VRC-3 and its man-pack counterpart, SCR 300 (Figure 7), are rated at three miles. They are provided to permit the close infantry-tank team coordination so vital to successful operation of the two arms.

The SCR 536 is a one-mile set, the familiar "Handie talkie," and is issued

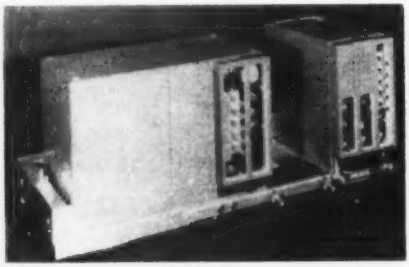


Figure 4.
SCR-528—Range: 7 miles, in motion, voice.

to armored infantry companies for control of their platoons when deployed as dismounted infantry.

Although radio must be considered as the primary means of communication in an armored division, other means play equally important parts when the tactical situation permits their use.

Quite frequently the statement is made by non-armored personnel, "But you don't use wire in an armored division." This statement is true when the division is rolling along at twenty or more miles a day. However, that situation usually exists only a small portion of the time that an armored unit is in a combat zone. Wire is used extensively in rear areas and during rest and maintenance periods. It is of particular value when the division is in an assembly area, and radios are silenced prior to an attack.

In general, the advantages of wire communication can be summed up as follows:

1. A telephone system is inherently more secure than a radio network.

2. Telephone speeds the delivery of messages.

3. A telephone system will handle a greater volume of traffic than a radio system.

4. Finally, there is an indefinable

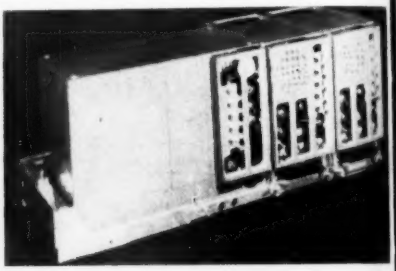


Figure 5.
SCR-508—Range: 7 miles, in motion, voice.

Figure 6.
SCR-510—Range: 5 miles, in motion, voice.

something one might call "user satisfaction." The American people for a number of years have demanded superior civilian telephone service. Habitual use has extended demands for similar military systems in the field. In most cases, however, military systems cannot meet such standards because of field conditions.

Telephone installations are provided if it is at all possible. With telephone, the commander of an armored unit can converse with another commander or staff officer with less fear of enemy interception than with radio. Instructions may be repeated; questions asked and answered without violating the rules of radio transmission.

There are disavantages also to the use of wire. In armored units during moving situations a telephone system may be installed with considerable expenditure of wire and manpower and then may be used only for a few hours, also unless considerable time is available for installing wires properly, the circuits are apt to be disrupted by vehicles.

In summary, wire communication is one of the most desirable means of communication, when the limits of time and space permit. The signal officer should be able to provide wire communication from division down to combat commands at least, and perhaps to a key battalion or two, until the division begins to move more than ten miles a day.

Regardless of how much electrical communication is installed, messengers still handle the "bulk" of the traffic. There is always a large amount of routine distribution that can be handled efficiently

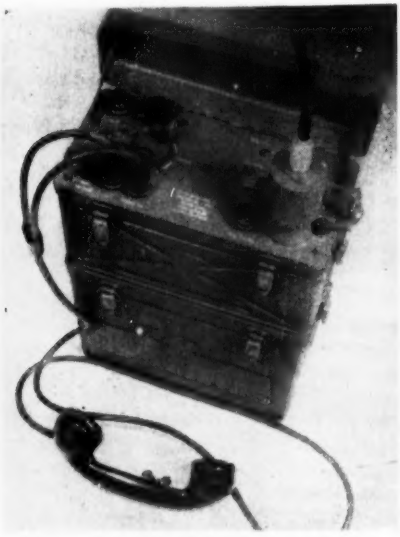


Figure 7.

Range: 3-5 miles, voice.

only by messenger. While messenger service is somewhat slower than the other means available, it is in most instances the most secure means. Cases of the enemy capturing a message from a messenger are rare. The proper selection and the training of messengers will have a direct bearing on the effectiveness of this communication.

Other means of communication are used in armored divisions, such as signal lamps, flags, panels, pyrotechnics, airplane, sound, and pigeons. These however, must be considered as secondary. It is noteworthy that only one of the above means was used to any great extent during World War II. Red and white fluorescent panels were used very successfully for ground to air identification, and were partially responsible for the successful operations by the air-armored teams in the latter phases of the European Campaign.

The use of these secondary means of communication are limited to periods when radios are silenced, wire communication is not available, and messenger communication is not practicable.

The communication equipment of an armored division, particularly the radio sets, are efficient, and in most cases are specifically designed for use in the armored division. Like any other technical apparatus it must be properly operated and cared for, if it is to remain effective. Adequate maintenance personnel must be provided. Technical knowledge is required to obtain maximum effectiveness for the radio sets provided. Every radio operator, whether enlisted or officer personnel, who uses a radio set must receive instructions and have experience in the care and use of such equipment. They must know the capabilities and limitations of the equipment, and how to get the most out of a set. To correspond with the extensive use of radio in an armored division, there must be equally intensive training in the use of radio without neglecting the other means of communication which are needed and which are provided.

Military victories are not gained by a single arm—though the failures of an arm or service might well be disastrous—but are achieved through the efforts of all arms and services welded into an Army team.

General of the Army George C. Marshall

Get the Weather On Your Side

Major James M. Fahey, *Air Corps*
Former Instructor, Command and Staff College

A war correspondent for the Associated Press in summing up his observations of the planning and initial operational stages of the invasion of Okinawa states, "That is how important weather is in the Pacific War. It ranks with guns and ammunition. It is the first step in planning, the final determination in execution."

This statement concerning operations in the Pacific can also be applied to all other theaters of operation without fear of contradiction. A study of operations in any theater will show the tremendous effect that weather had on the activities of the adversaries while a closer examination will further demonstrate that the commander who realized the importance of weather in his operations, and incorporated weather information into his planning took the field with an advantage which often led to victory. Other campaign studies will reveal where commanders ignored the weather in their planning only to find that they were unable to achieve their objectives due to the unanticipated influence of atmospheric conditions.

Many commanders and staff officers have failed to appreciate the wisdom contained in the statement of the quoted war correspondent. Despite lessons clearly pointed out in the past war, there is still a reluctance, especially on the part of some ground and service personnel, to bring weather into operational planning. This contention is borne out by the fact that in some of our service schools today, we find that weather as a subject on the curriculum has been only lightly treated.

Perhaps it is necessary to point out the importance of weather information in planning and in operations. World War II, which can be considered the first major engagement between nations where foreknowledge of weather conditions was possible, should contain enough examples to convince the most skeptical.

Interrogation of German prisoners of war has brought out their story of the planning of the Battle of the Bulge. Rundstedt in this situation gives to history a good example of how weather information can be used in military planning and operations. Late in November, the German commander went to work with his weather service for the purpose of determining when, in the near future, he would be able to launch a large scale offensive against the Allies with the assurance that he would not be hampered by enemy air superiority. He was obviously aware of the fact that the German Air Force was incapable of protecting his troops and immediate lines of communications so he went into a study of the the one force which could do the task for him—weather. German meteorologists informed him that his desire for seven consecutive days of weather which would ground

XUM

Mobile stations of this type were employed in ETO and in MTO to provide weather this equipment for work in France and Germany. The Station Weather Officer generally (U. S. AAF

Allied tactical aircraft had the best opportunity of being realized during the latter half of December. On 14 December the German forecasters told their commander the exact date, 16 December, on which he could start his operation so as to have the protective cover of weather for the period demanded.

In planning this operation, the German High Command either ignored or minimized the effects of the weather on their own movements. As a result, while atmospheric conditions protected their troops from Allied air attacks, at the same time they made movement off the main roads extremely difficult and so impeded the German advance that securing the main objective was doomed to fail at the outset. In spite of the final result of this operation, the fact should not be overlooked that the Germans realized the potentialities of weather as a weapon. Weather responded by prohibiting Allied air attacks more efficiently than the German air force antiaircraft units could have done.

Although the invasion of Leyte was made necessary by other considerations which overruled the weather situation, this operation offers a good example of the effects that weather can have on such an undertaking. The invasion took place during a period which offered the least desirable weather conditions for this type

service to rapidly moving ground forces. An entire weather squadron was equipped with acted as Staff Weather Officer for the command to which the station was attached. photos.)

of campaign. Planners were aware of this fact when the decision was made that the invasion would go on despite weather indications.

Weather conditions encountered were in accordance with the studies rendered prior to the operation. Because of this, the campaign was prolonged beyond the date set for securing the island. The infantry encountered considerable difficulty fighting under the conditions imposed by nature, while the construction of airfields and supply installations necessary for the support of the invasion of Luzon was so delayed that it was necessary to postpone D-day for Luzon from 20 December 1944 to 9 January 1945.

To emphasize further the importance of weather in military operations it might be well to consider the German invasion of Poland, the cracking of the Mareth Line in Tunisia by the British Eighth Army, the Jap withdrawal from Kiska, the flight of the *Gneisenau* and the *Sharnhorst*, and the invasion of Normandy, in which weather was an important part of the planning and execution of the operation—in fact, in some cases, weather was actually used as a weapon.

In view of the importance of weather in staff planning and in field operations, it behooves military personnel to become more aware of the limitations and capa-

bilities of weather forecasting, more familiar with the types of weather information that are available, and more appreciative of the role that this information can play in modern warfare.

Many people have the tendency to ignore weather forecasts and studies because of insufficient knowledge of the capabilities and limitations of forecasting, plus an inclination to remember only when the forecaster missed and not when he hit. The science of meteorology—if it may be called a science and that is a debatable point—is not such that it permits exact calculations as regards weather conditions. Its exactitude is so low that experience is more important in weather forecasting than it is in many other lines of endeavor. Meteorology is not objective in the sense that the forecaster can make several calculations and then come out with the right answer. Rather it consists mainly of a subjective analysis and evaluation of the various physical phenomena that cause weather, with the result that human judgment can bring into the situation erroneous deductions. In addition, while weather forecasting is an old practice, the science of forecasting is still in its infancy. Considerable research is still being done on what seems to be an elementary matter—the general circulation of the atmosphere—but little has been accomplished. Yet the solution of this problem would open the gates to a flood of solutions of other dependent problems.

Despite this lack of basic knowledge, weather forecasters, mainly through experience, have reached a stage of development where they are able to forecast weather conditions over a period of time with a considerable degree of accuracy. Here again it is difficult even to state the degree of accuracy objectively—since there are several schools of thought on how to judge the accuracy of a forecast—but one is not far in error when he places the accuracy at approximately eighty per cent for short range forecasting, that is, forecasting for a period of forty-eight hours or less, while forecasts covering longer periods of time will be less accurate. The amount of publicity given to long range forecasting has created an erroneous impression of the ability of meteorologists in this field. Long range forecasting as it exists today is far from satisfactory and prognosticators would be among the first to admit, if not proclaim, this fact. Extensive research has been done on the problems of forecasting for five days in advance and, although this work has been going on for several years, little has been accomplished towards turning out a practical, detailed and precise five day forecast. However, there are some exceptions to this general statement, since in certain types of weather situations it has been possible to render five day forecasts with a high degree of confidence. Attempts to forecast for periods of more than five days have usually produced general forecasts of limited value.

A knowledge of these limitations is necessary to every commander and staff officer who intends to utilize weather information in his planning. He, or they, must be aware of what the forecaster is capable of doing and what he cannot do. Without this background, personnel are apt to expect too much from the weather section with the result that when they are informed that the information cannot be given with any degree of confidence, the impression is created that the weather service cannot forecast the weather and weather drops out of the planning picture. On the other hand, when the commander knows the capabilities of his weather personnel, he can arrange his plans accordingly.

Weather information used for military planning usually falls into three categories, the climatic study, the long range

forecast, and the short range forecast. These in turn fit into long range planning, where the operation is more than two weeks distant; short range planning, where the operation is three days to two weeks distant, and immediate operations, where the execution of the plan is to take place within forty-eight hours.

The climatic study is not a forecast but rather is a historical statistical survey of the weather over a particular area. This survey reports the weather probabilities for the area under surveillance. In it can be found data on maximum and minimum temperatures, frequency and amount of rainfall, cloud cover, cloud heights, visibility, and wind conditions. There is little indication of the current trend of the weather in this type of information and no element of timing. Although the study may show that on the average, rain may be expected on fifteen days during a particular month, no information will be available as to whether this season will vary from the average, nor on which of the thirty days of the month we may expect the rain.

While some conception of the value of this information may be immediately apparent, still greater value can be found hidden in the data. When these data are broken down from compiled form into annual records, they provide indications concerning the probability of the various weather phenomena. This information can then be used to determine the best time of the year or season to stage a particular operation.

A prime example of the use of this type of information can be found in the planning of the Normandy invasion. After the Supreme Commander had determined *what* weather conditions were necessary for the invasion, weather personnel attacked climatic data to determinine what time of the year would offer the best chances for success. Their study showed that the "odds" were 24 to 1 against good weather in May, 13 to 1 against, in June and 33 to 1 against, in July. Thus it was apparent that June was the best month for the invasion although the "odds" were still against getting the weather required.

A similar study was compiled earlier to determinine feasibility of utilizing large scale airborne tactics in North Africa during the winter campaign in that area. However, the climatic data clearly pointed out that the probability of obtaining sufficient consecutive days of favorable weather to support such operations was too low to warrant the effort.

Many other uses for this type of information have been found besides that of determining invasion dates in advance. The design of equipment, the need for special items of equipment—such as snow plows—the determination of what weight fuel to use and store are a few of many other items which find a study of climatic data of remunerative value.

The long range forecast, while not approaching the accuracy of the short range forecast, is still of value in planning stages. Due to the inadequacy of forecasting tools and techniques, it is often necessary for the meteorologist to restrict the wording of a long range forecast to general terms. Despite such generality, the information can be used for planning purposes. This type of information has two outstanding values. First, if previous planning has been based on climatic studies, the long range forecast will give an indication to the planner how this particular season will vary from the average. Thus in the case where the climatic data indicated that fifteen days of rain would be encountered on the average, the long range forecast may show that possibly only three days of rain are to be expected during the first half of this period. This change of weather conditions would be of considerable use to the planners for it would permit them to alter their plans well in advance.

Second, the long range forecast brings *timing* into the weather planning for the first time. Here will be found information indicating the rainy periods during the forecast interval, and this will permit more detailed operational plans to be made.

The short range forecast, which is the most accurate as well as the most precise and detailed item of prognostication put out by the weather service, acts as a stop and go sign for military operations. Whereas climatic studies and long range forecasts may form the first step in planning, the short range forecast is the final determining factor in execution. It should be remembered that it was a short range forecast that postponed the invasion of Normandy for twenty-four hours, and also set off the crossing of the Roer.

This forecast times the occurrence of weather phenomena in terms of hours and gives a detailed statement of weather for the immediate future. The period that this forecast may cover accurately is dependent on various factors such as the season, the particular weather regime that is governing the area at the time, and the area in which the forecast is being made. In some localities, such as England, forecasts of this nature frequently cannot cover a period of more than twenty-four hours, while in other areas, such as the lower California coast in the summertime, the forecast might extend to a period of seventy-two hours with considerable accuracy.

The true value of the short range forecast lies in its detail. On this information definite plans may be made although in most cases it is advisable to have an alternate plan ready in the event the forecast is not correct. A few illustrations of the use of this information might include the strengthening of patrols when poor visibility is predicted, preparedness to ward off surprise attacks under the same conditions, or the positioning of troops for a surprise offensive. A forecast of heavy rain for the immediate future might make it advisable to move artillery forward before the rain so that they would be in a position to strike against enemy vehicles which might be immobilized by the resulting mud. This latter situation is one reported to have been used by the Russians on several occasions much to the distress of the Germans.

Regardless of what stage the planning of a military operation might be in, there is a place for weather information. The role that this information plays will be variable depending on the operation. Airborne operations demand that the consideration of weather assume a high position, while logistical planning in some cases may not find the weather so important. Regardless of the nature of the operation, if the weather information is utilized properly only one result can be forthcoming—a more efficient operation.

In combat operations, particularly of an amphibious nature, weather may be the first line of defense for the enemy. It is a defense that cannot be breached by heavy guns or tons of bombs. It can only be overcome by thorough pre-planning which recognizes the potentiality of the atmosphere and the ability of weather personnel to help solve the problem.

Weather is an ever-present factor in every operation. Proper use of it invariably pays dividends. Failure to plan on it may lead to catastrophe. Since the cost of military failure is so high in terms of lives and equipment, and failure due to weather can be overcome by proper weather planning, all military personnel should become more cognizant of the capabilities and limitations of weather forecasting. The necessity for coordinating air power and ground power makes this "should" a "must" for ground force officers.

Duties of

Naval Staff Divisions

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Former Director, Navy Section, Command and Staff College

Operations vs Administration

IN their basic nature, the functions of naval command afloat are, of course, the same as those of any operating military command anywhere. All operating command functions may properly be grouped under either one or the other of the two broad classifications of administration on the one hand and operations on the other. In peacetime, there is an inevitable tendency for the administrative functions to grow in relative importance and for the operational functions to receive a correspondingly smaller part of the attention and effort of the commander and his staff. This expectable, but highly regrettable, accompaniment of peace years is common to every military command echelon in the armed forces of any democratic nation. It is just as true in the U.S. Navy as it is in the U.S. Army.

This underlying shift in emphasis, in command functioning, from the operational to the administrative is, naturally, a cycle whose beginning and end coincide with the termination and incidence, respectively, of major international crises or of actual wars. Thus, the phenomenon develops some-what imperceptibly, and requires a period of several years to reach full-blown maturity. There is a more frequently occuring shuttle in activity between the two functional fields, however, which accompanies and features recurring periods of active exercises by the various commands. When fleet, task force or army field maneuvers are taking place, operational functions regain their proper ascendency over those of an administrative nature for, at least, the period of the active maneuver. In the case of naval operating forces at sea, this transition is even more marked and sweeping than in that of army forces engaged in field maneuvers ashore. In broad outline, the latter fact is due to the two factors of: (a) the more self-contained character of naval vessels, as contrasted with troop organizations on land, in respect to logistics, personnel and communications, and (b) the impracticability of extensive use of radio, wire, or other communication systems beyond visual range, between cruising elements at sea.

There are no hard and fast categorical distinctions which can properly be drawn between the administrative and the operational functions of command. In general, however, it is sound to consider the four "G" functions of the U.S. Army general staff system (i.e., Personnel, Intelligence, Operations and Logistics), as being primarily operational in their nature, and the numerous special staff functions as essentially administrative. While all—both general and special—staff activities are necessarily closely integrated and do share in varying degrees in both the administrative and the operational spheres, nevertheless this broad distinction between the two will not be found to be misleading so long as it is intelligently construed. Certainly, it will prove very helpful in ac-

quiring a balanced over-all view of staff duties in the U.S. Navy.

Examined from this angle, we may return to, and amplify, the earlier comment to the effect that the shift in emphasis from the administrative to the operational during maneuvers is most marked in the case of naval forces at sea. In the staff afloat of such a naval command, the Intelligence (G-2), and the Operations (G-3) functions completely overshadow those of Personnel (G-1), and Logistics (G-4). Also, the special staff duties fall away to a small fraction of their scope in port or on shore. In this connection, the qualification "afloat" should be well noted, for it is frequently the case that the staff of the commander of such a fleet or major task force will include a rear or administrative echelon, left behind at the base or bases from which the force is operating, to carry on the housekeeping duties of personnel and material procurement, maintenance and training, of administration generally, and the myriad special staff functions therein included. Such a rear staff echelon is not included in the term "staff afloat," as used in this part of our discussion.

Officer Assignments

It is the universal practice in the U.S. Navy to utilize special staff officers in dual—or even more multiple—capacities in operating staffs afloat. This practice owes its existence not only to the relatively dormant state of special staff and administrative functions during cruising periods, but also to two other compelling considerations. First, staffs afloat *must* be kept as small as possible in order to avoid too heavy demand upon the severely limited living and working space and accommodations on shipboard. Second, officers assigned as special staff officers in the Navy are, in the main, *line* officers with a common background of service experience. Although specialists in name for the period of their assignment in the particular job, they all have, in fact, the same familiarity with the various types of ships, weapons and equipment, and they are all passing through the same conditioning for eventual command. Of course, true naval staff corps officers, such as supply and medical officers, do not fall under the category, but such bona fide specialists are seldom carried on the commander's staff afloat; they normally remain behind with the rear echelon.

A typical officer roster of the staff of a Fleet or Task Force Commander afloat is shown on page 43. Each officer listed has, of course, assistants in numbers dictated by the size of the force, the complexity of forthcoming operations and the available accommodations in the flagship.

At sea, these officers are usually assigned to the two paramount staff divisions as indicated on the chart. Any necessity which may arise for specialists marked (*) to perform special staff functions in their respective fields is considered as subordinate to their duties in the Operations or Intelligence Divisions, as the case may be, for the entire period of the maneuver or operation. One other significant feature of these assignments may be noted, viz: with the exceptions of the Chief of Staff and the Intelligence Officer, every officer has duty—either primary or secondary—in the Operations Division. This overwhelming preponderance of operations functions accounts for the fact that the Operations Officer is customarily designated as the Assistant Chief of Staff.

With the above typical working organization for periods of active operations, the operating naval staff afloat, under the supervision and coordination of the Chief of Staff, renders professional assistance to the commander in his command duties of (a) making estimates, (b) preparing plans, (c) formulating and issuing orders and directives, (d) guiding the training and preparation for battle of the force, (e)

TITLE	*SEA ASSIGNMENT*
1. Chief of Staff	Deputy Fleet or Force Commander
2. Operations Officer	Operations Division
3. Flag Lieutenant and Aide *	Operations Division
4. Flag Secretary *	Operations Division
5. Gunnery Officer *	Operations Division
6. Aviation Officer *	Operations Division
7. Communications Officer *	Operations Division—primary duty, Intelligence Division—secondary duty.
8. Intelligence Officer	Intelligence Division
9. Marine Officer *	Intelligence Division—primary duty, Operations Division—secondary duty.
10. Aerological Officer *	Intelligence Division—primary duty, Operations Division—secondary duty.
11. Logistics Officer	Operations Division for secondary duty.

Chart 1.

conducting maneuver and controlling combat action.

Duties of the "G" Divisions

An outline of a typical assignment of specific duties to each of the "G" divisions of a Fleet or Task Force Commander's staff follows. The reader should note the fact that the listed precis of the responsibilities of each division *includes the functions of the rear or administrative echelon* of the staff. Also, commanders may—and frequently do—modify this typical assignment to meet particular conditions. The discussion which has gone before, together with pertinent comment at appropriate points hereafter, will serve to indicate the general line of demarcation between work normally carried on by the *operating* echelon in the forces at sea and that normally handled by the *administrative* echelon at the base or bases in the rear.

The Personnel Division (G-1).—The duties of the naval G-1 are, normally, very light as compared to the other "G" divisions. It may fairly be said that the division is the least active of the four. In general, its responsibilities are limited to cognizance of the condition and adequacy of the personnel of the command as related to effective prosecution of the operations in hand, cooperation with the G-1s of any Army or Marine Corps commands which may be subordinate or directly associated, and physical handling of prisoners of war. Specifically, G-1 is accountable for:

(a) Maintaining personnel statistics, recording casualty reports and preparing personnel strength reports and graphs, and replacement requirements;

(b) Adequate health and morale of personnel with respect to battle efficiency;

(c) Collection and disposition of prisoners of war.

As we have seen, the G-1 functions in the operating echelon of the staff of a purely naval force are minimized; the occasional need for their performance, under normal conditions, is usually met by requiring either the Flag Secretary or the Flag Lieutenant to act as Personnel Officer, in addition to his other duties. The bulk of the personnel work for the command is primarily administrative and is carried on in the rear. In amphibious operations under naval command, however, the G-1 takes on greatly increased importance in the operating echelon, due to the commander's added responsibilities in the fields of relations with the civil government and the civilian population in occupied territory, including

establishment of military government or of martial law. Full time assignments of qualified personnel must be made to the division when these conditions exist.

The Intelligence Division (G-2).—The naval G-2 has the primary duty of keeping the commander and the remainder of his staff thoroughly informed regarding the enemy situation, movements and capabilities. The division collects, evaluates, and determines the significance of all enemy information available. In this task, the naval G-2 endeavors constantly to maintain the enemy point of view. In other respects, the duties of the division compare quite closely with those of the Army G-2 ashore. Specifically, the naval G-2 is charged with:

(a) Compilation and maintenance of records of all acquired intelligence bearing on the enemy national war potential, on the disposition, strength, material and physical condition, morale and leadership, and on the movements, of enemy armed forces of whatever kind, and on any con ditions existing or likely to occur in the theater of operations which may have conditioning impact upon enemy activities.

(b) In the preparation of any estimate which may be required of the commander's staff, responsibility for:

(1) Preparation and presentation of a complete enemy intelligence summary, including assembly and tabulation of the enemy order of battle and unit strengths, and estimated enemy capabilities and courses of action.

(2) Preparation of an estimate of the situation from the enemy point of view. The degree of detailed completion to which this step can be carried will vary with the time and information available, but it forms an essential and very valuable feature of the G-2 contribution to the staff estimate, even though it may be in skeleton form only.

(3) When practicable, preparation and maintenance of a time-position chart for enemy naval forces, to permit earliest possible determination of the most probable enemy intentions as indicated by sightings or by the absence of contacts in any given sector.

(c) Advising G-3 as to essential intelligence to be gathered and as to the most suitable means of obtaining it.

(d) If needed, preparation of the draft of the commander's Intelligence Plan.

(e) Maintaining a running enemy intelligence summary and the presentation thereof to the commander and staff at periodic intervals or whenever significant developments appear.

(f) Advising as to the urgency and proper extent of dissemination of intelligence to subordinate units of the command, together with the preparation of dispatches or other communications, when authorized, to that end.

(g) Supervision over censorship activities, counter-espionage and counter-propaganda.

(h) Examination of captured equipment and documents, and interrogation of POWs.

The above G-2 functions are common to all echelons of all naval staffs. In the case of the Fleet or Task Force Commander afloat, the major emphasis in the Intelligence Division of the operating echelon of his staff naturally falls on the immediate tactical aspects of enemy situation, strength, movements, etc., rather than on the longer range strategical implications. These latter constitute a more important part of the purview of G-2 in the rear.

The Operations Division (G-3).—The naval Operations Division constitutes the principal executive element of the staff. G-3 is closely supervised by the Chief of Staff, but he has, at any time, the right of direct access to the Commander, himself. U.S. Navy Regulations prescribe that the Operations Officer should be the line officer

next in rank to the Chief of Staff and should be designated the Assistant Chief of Staff, if that office is authorized for the command. The Operations Division is charged with those functions of the staff which are directly concerned with organization and assignment of tasks, training within the command (except certain technical aspects which are assigned specifically to special staff officers), preparation of operational plans and orders, disposition and readiness of the force for action, and supervision of actual combat operations. In general, the duties of the division correspond with those of its U.S. Army counterpart. Specifically, the naval G-3 is responsible for:

(a) Preparation of operational plans for the employment of the command and, under the supervision of the Chief of Staff, coordination of the contributing and component plans of the other "G" divisions.

(b) Supervision over the training and readiness of the force or fleet for battle.

(c) Compilation and presentation of all intelligence bearing on the following:

(1) Strength and condition of readiness of all units of the command (in collaboration with G-1 and G-4).

(2) Current location and prospective employment and movements of all units of the force.

(3) Strength, condition, whereabouts and prospective movements of all U.S. and allied forces in the theater of operations.

(4) Features, events and conditions within the theater which may affect the plans of future operations of the command. (Note that G-2 is concerned with all aspects of intelligence from the *enemy* standpoint, while G-3 is responsible for intelligence of his *own* and allied components.)

(d) Supervision over the preparation of estimates of the situation, coordinating, under the Chief of Staff, the component sections thereof from the other "G" divisions.

(e) Formulation and issue of operational directives of all kinds.

(f) Conduct of tactical and strategical studies, preparation of "SOPs" such as "Task Force (or Fleet) Cruising Instructions" with their accompanying prescribed cruising dispositions and tactical procedures.

(g) Supervision over the selection of routes and responsibility for the safe navigation of the force in company (the senior Assistant Operations Officer is normally designated Force or Fleet Navigator).

(h) Reconnaissance and security measures (in coordination with G-2).

(i) Protection of lines of communication (in coordination with G-4 and G-2).

(j) Recommendations to the commander regarding operations to be undertaken as a result of:

(1) Orders from higher headquarters.

(2) Study of the enemy situation and capabilities.

(3) Activities of coordinate or allied forces.

(4) Disposition, morale and capabilities of the command, itself.

(5) Study of special features or conditions within the theater.

The above typical functions are common to all naval G-3s in all echelons of naval command. Like the G-2 Division, the G-3 of the operating echelon afloat is more directly and vitally concerned with the immediate tactical aspects of his many responsibilities than he is with the longer range strategical features; the latter are of paramount significance to the rear echelon and to the area or theater staffs.

The Logistics Division (G-4).—The duties of the naval G-4 have their roots in the responsibilities of the commander to insure adequate logistic support for his force and to control the logistic agencies and elements within his command. Thus, G-4 determines logistic requirements to support impending operations, informs re-

lated supporting agencies what these requirements will be, correlates the logistic activities of the command with those of associated commands, and endeavors to insure maximum efficiency and economy in the use, by the command, of all services, facilities and supplies.

The vital relationship between the logistic service requirements and the current and impending operations of the command makes mandatory the closest coordination between G-4 and G-3. In this regard, we have already noted that the Logistics Officer in the staff afloat is assigned additional duty in the Operations Division. In this capacity, he is responsible for advising as to the practicability, from the logistic standpoint, of any operations under consideration. Likewise, he makes recommendations as to the employment and control of all available logistic elements in any projected operation or campaign.

The Logistics Division maintains record of all damage received, repairs and alterations effected, and the current material condition of all units and equipment in the command, and of their status in respect to ammunition, fuel, water and general stores on hand. It analyzes action reports and reports of damage with a view to improving resistance to, and control of, damage, both as to the physical features of ships and aircraft and as to the procedures employed by their crews. Specifically, the naval G-4 is responsible for:

(a) Establishment and promulgation of advance plans for, and supervision over the actual conduct of, material maintenance, damage control, overhaul and repair, and salvage of all ships, aircraft and equipment within the force.

(b) Obtaining, transporting, storing and issuing all general supplies, including ammunition, to the command.

(c) Obtaining, or constructing when necessary, maintaining and operating all service facilities and installations ashore. These include supply dumps and depots, overhaul and repair yards and facilities, evacuation establishments and public utilities, including land transport.

Logistic planning and functioning in the operation of naval forces, just as in the case of any mobile armed force, no matter what its nature, must be projected well into the future in order to be effective. In naval warfare, the major logistic activities of the fleets and task forces are necessarily shore based and to the rear; hence, the G-4 of the operating echelon of the staff afloat finds his primary concerns in the immediate problems posed by the tactical aspects of the operations of the force. The long-range planning and servicing tasks associated with the strategical aspects of the campaign—and future campaigns—occupy the attention and effort of the G-4 organization in the rear echelon of the commander's staff or of the theater staff, itself.

The salient features sketched in the foregoing brief portrait of staff division duties in the Navy may be summarized as follows:

(a) The staff is frequently divided into an operating, or forward, echelon which is afloat with the commander, and an administrative, or rear, echelon which remains behind at the base or bases.

(b) The size of the operating echelon is kept at the minimum, due primarily to lack of space and facilities on board ship.

(c) The operating echelon confines its activities at sea almost exclusively to the operational functions of command, with emphasis primarily on the more immediate tactical aspects of the campaign or maneuver.

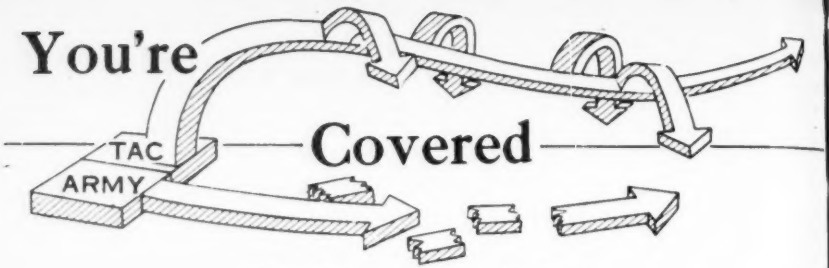
(d) The bulk of the administrative duties of the command, including almost all personnel planning and functioning, special staff duties, and most of logistics, are carried on in the rear echelon. The rear echelon emphasizes strategical aspects and long-range planning.

(e) Special staff officers do go along with the operating echelon, and they are normally assigned for paramount duty to either the G-2 or G-3 divisions of the staff throughout the period of active operations of the force. Although specialists in a sense, these officers are, with few exceptions, line officers whose training and background fits them for duty in the "G" divisions of the staff.

I hate war as only a soldier who has lived it can, only as one who has seen its brutality, its futility, its *stupidity*. Yet there is one thing to say on the credit side—victory required a mighty manifestation of the most ennobling of the virtues of man—faith, courage, fortitude, sacrifice! If we can only hold that example before our eyes; moreover, if we can remember that the international cooperation then so generously displayed points the sure way to the success of the United Nations Organization, then the war can never be regarded as a total deficit.

General of the Army Dwight D. Eisenhower

You're Covered



Major Walter A. Smith, *Air Corps*
Instructor, Command and Staff College

ARMORED columns had over-run most of France, leaving their supporting infantry miles behind. Shaken loose after the intense aerial bombardment at St. Lo, armor of the Third Army had passed through the gaps in the enemy lines hacked by the First Army and raced for the logistically important ports of Brest, St. Nazaire and Lorient, then wheeled and dashed to cut off a retreating enemy at the Seine.

Operating far in advance of the main concentration of troops, these armored spearheads were demonstrating, together with a proven concept of the application of air power, the classic role of the armored vehicle in mobile warfare.

Lacking the customary protection of the infantry, the armored units were forced to rely on something new in the way of covering fire: the fighter aircraft.

The fighter aircraft, organized in squadrons and groups is the principal striking weapon of the Tactical Air Command, the air component of the Army/TAC team. Each Tactical Air Command is organized and equipped to operate in conjunction with a field army, providing it with the fire power inherent in the tactical and strategic mobility and the flexibility of an aerial striking force. Control is vested in an air commander who is the co-partner of the ground commander. Planning of all air effort is a matter of joint consideration of the air and ground situation and of the characteristics of the two components. The offensive mission of the Tactical Air Command has been divided into three primary phases or priorities namely, to gain and maintain air superiority, to isolate the battle field, and to further the over-all scheme of maneuver by contributing to the fire power and shock action of the ground units. Three actions take place simultaneously in the degree indicated by the conditions at hand, and it is often difficult to differentiate among them, particularly the latter two. The reduction of an enemy strongpoint by air action is certainly a contribution to the ground effort (phase three) and at the same time may be restricting the enemy's movement into the battlefield (phase two).

As the pilots above the tanks keep the air over the advancing tankers clear of enemy attackers they are engaged in maintaining their superiority in the air (phase one). Their dive bombing attacks against the bridges over which the enemy may be reinforced is a contribution to the isolation of the battlefield (phase two), and as they strafe a strongly entrenched antitank gun and spot a road block they are engaged in a coordinated air-ground action (phase three).

Conceived in the joint headquarters of the Third Army and the XIX Tactical Air Command, armored columns covered

by fighter aircraft reached a high degree of development in the Battle of France. The problems were manifold as the planners visualized an extremely fluid and mobile warfare in which the tanks would far out-strip normal means of support, and communications would be taxed to the limit. It was realized that there would be no possibility of the normal concept of the so-called pre-planned missions that were the order of the day in a more static situation. The problem was reduced to three principal elements: planning, communications and liaison, and speed of execution.

Necessarily, tactical planning at the higher levels, could encompass only a basic assignment of air units to areas or zones of operation while the on-the-spot execution of tactics and technique had to be left to the initiative of the armored vehicles and aircraft crews in actual contact with the situation.

The air plan will be a result of the ground plan, but both must be thoroughly coordinated in order to allow for operational peculiarities of either force; hence the necessity for joint planning is demonstrated. The plan will fall into four broad categories: the concentration, the attack, the breakthrough and the exploitation.

The air force plays a manifestly important part in both concealing and protecting the concentration by intensive first priority missions. It was Lieutenant

P-47s took a heavy toll near Kaiserslautern. Such attacks paved the way for ground forces. (U.S. AAF photo.)

General Linnartz, Commanding General of the 26th Panzer Division who complained: "Allied air attacks compelled us to execute most of our tank movements at night and remain concealed by day—air attacks against our tanks became more and more effective with the decline of our own air force and and as soon as Allied air superiority was complete they were able to pick out and forestall any tank movement . . . . "(i.e., concentration) "With the attainment of air superiority on your part, the fact of tank units operating in masses was predetermined. . . ."

We have the pattern for the planning and execution of the attack from Cassino to Echweiler, with each step marked by improvements over the preceding one, while the classic breakthrough example may be taken from St. Lo.

Up to this point the execution of the plan may be closely controlled by the commander, but with the advent of the period of exploitation, control becomes increasingly more difficult due to the fluidity of the situation. The air action then takes the aspect of the logistical and time and space limitations imposed, with perhaps nothing more than a proposed axis of attack on which to base the plans. The use of phase lines offers the advantage of ease of control but introduces a certain amount of inflexibility, and since exploitation is largely the result of opportunism, flexibility in planning and control is highly desirable in promoting initiative and ingenuity.

Communications and liaison, though rightly a part of the joint planning, is considered separately in view of its importance. Effective liaison may be accomplished by the transfer, among the interested units, of personnel for the purpose of mutual understanding of the problems confronting each, and of the results to be expected under as many conditions as may be foreseen.

Air to ground and ground to air communications were simplified by the installation in ten to fourteen tanks per division of the same very high frequency (VHF) radio equipment as in the fighter aircraft. To further the results attained by liaison and communication an air officer with considerable aerial combat experience was placed in each VHF equipped tank to advise the unit commander and to aid in the direction of the air attack when initiated. His background and experience were of great benefit in directing the pilots of the attacking aircraft in that he was able to visualize the terrain as they were seeing it from the air and so guide them through air recognizable landmarks to the target.

Speed of execution was made possible by two methods of air-armored column cooperation: armed reconnaissance and column cover. Both methods were extremely flexible and consequently resulted in marked resourcefulness by both pilots and tank crews.

By the time the period of exploitation was well under way, the enemy was in full and confused retreat. Armed reconnaissance was given the principal mission of isolating the battlefield.

This assignment posed a particularly difficult problem, because General Patton's first request to the XIX TAC was "Don't blow up the bridges." Isolation of the battlefield took on an entirely different character. The ground units wanted air power to prevent movement of the enemy *from* the battle area rather than *to* it and to carry out this mission without disrupting lines of communication to the extent that the action would cause a delay to the pursuing armored forces as they closed on the enemy.

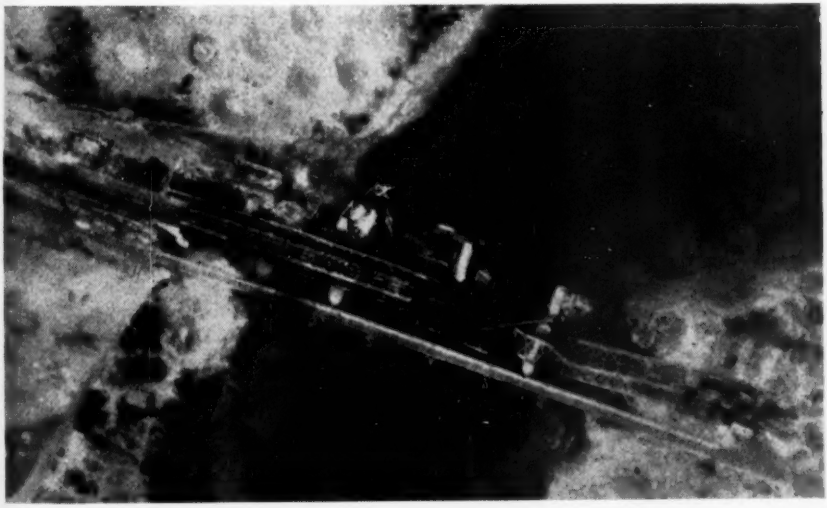
Ranging deep in enemy territory, practically unmolested by enemy aircraft, armed reconnaissance fighters sought out targets of opportunity. By striking near the head of the fleeing column, an effective road block was created by the resulting wreckage and confusion. It was

necessary that the troops clear the roads themselves—entailing more delay—before the main body could pass. This was interdiction of a most satisfactory type. The constant harassing action of the program of armed reconnaissance gave the retreating enemy no opportunity for respite, no possibility of concentration for a counterattack.

Advancing units passed mile after mile of burned out vehicles and litters of abandoned equipment—silent testimony of the effectiveness of armed reconnaissance. In addition to attacking the moving columns, the fighters also sought out supply installations whose destruction would further delay the enemy. An officer captured in the Falaise Pocket had this to say: "You have bombed and strafed all the roads, causing complete congestion and heavy traffic jams. You have also destroyed most of our gasoline and oil dumps, so there is no future in continuing the fight."

Unfortunately, this was a minority opinion so that resort had to be had to a second type of armored column cooperation: armored column cover.

While armed reconnaissance was ravaging an area limited only by the range of the aircraft and the head of the advancing friendly units, there cruised above the point of the advance four to eight fighters. Bombers had long enjoyed fighter escort; why not escort armored columns? The role of the fighter in bomber escort is to protect the bomber stream from outside interference so that the bombers may concentrate on their primary objective. Applying the same principle to armored column cover, the tankers were freed of the threat of aerial interference and at the same time enjoyed the added fire power of the bombs,



Bomb damage to Oissel Bridge over Seine River, France. (U.S. AAF photo.)

Effects of fighter-bombers on German transport in France. (U.S. AAF photo.)

rockets and machine guns of their escort.

The original concept of the cover was that the aircraft could cope with any air attack against the column in addition to seeking out enemy strongpoints and neutralizing them. Developments modified this role slightly, however. Luftwaffe opposition to the armored thrusts were negligible; only one daylight attack developed during the Brittany campaign. The absence of enemy air action allowed more freedom of action of the cover, and they ranged as far as twenty to thirty miles in advance and on the flanks of the columns. This freedom allowed the fighters to break up any local attempts at counterattacks overlooked by the longer range armed reconnaissance planes.

Although, it was visualized by the planners that the fighter cover would be able to discover and destroy pockets of resistance, it was later discovered that the speed of the aircraft made observation difficult, and, in fact, it was the armored force that more often than not originally discovered the resistance. This condition brought about the system of placing an air officer in the leading tank elements to direct the fighters to the target.

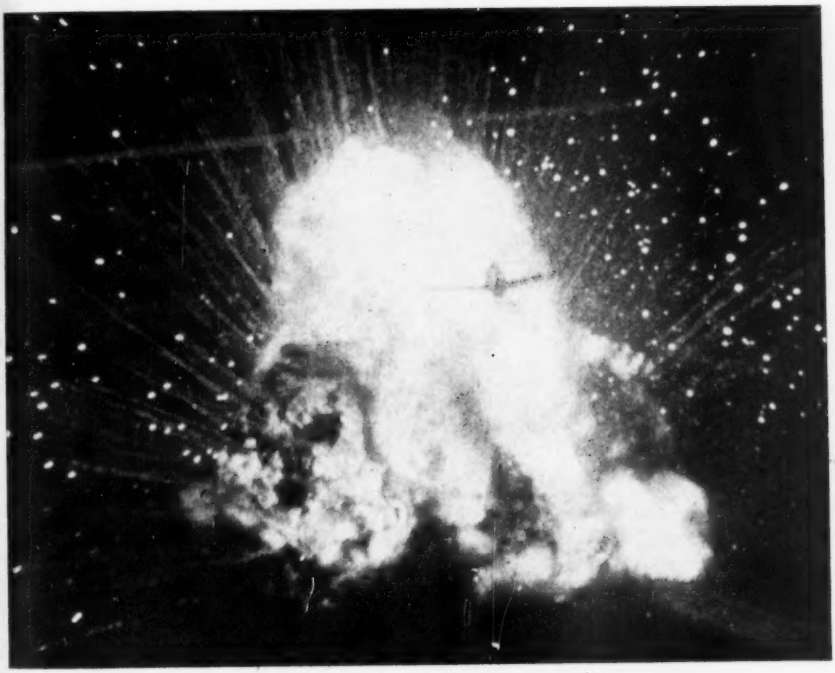
As developments progressed the difference between the cover and the reconnaissance elements of the mission became less and less. Often the size and range of the formation was the distinguishing feature. Because the reconnaissance force ranged deeper into enemy territory, their numbers were greater for mutual protection against enemy air action since the *Luftwaffe* was more prone to rise against an attacker than take up the offensive role itself. The cover, on arriving at the head of the column, checked

in with the forward observer by radio and if no request missions were at hand, went off in search of a target just as did the reconnaissance force. The lessening of enemy aerial resistance and the increase in the speed of advance of the armor (due to a decrease in enemy delaying action) made for greater freedom of action of the cover, allowing it to become more and more like the reconnaissance force.

Actually the term "covering force" is misleading, for the formation in no sense acted as an umbrella for the armor. They did not circle aimlessly above the ground force. Their mission was to assist the advance of the armor more directly than by mere reconnaissance in two principal ways: in warding off enemy air attacks, and in removing obstructions and the sources of these obstructions.

It is true however, that the radius of action of the covering force was the protection of the armor. The limits to this radius were entirely dependent upon the *Luftwaffe*. The more the aerial opposition, the closer to the armor these flights were forced to be.

As long as there was a threat of enemy air opposition the force was necessarily near the column, but as the Germain air force husbanded its strength and refused to fight, more freedom of



A P-47 destroys a German ammunition truck. (U.S. AAF photo.)

action was allowed the cover. The same condition was reflected in the longer range flights. Their size could be reduced, thus offering a wider variety of action for the increased number of flights.

Maintaining a constant aerial viligance over the armored columns during the daylight hours entailed the use of a great number of aircraft even if small flights of four to eight aircraft were employed. As a result, an entire fighter group was assigned the *mission* of covering an armored division. At first sight it might appear that this policy was opposed to the doctrine of command and employment of air power that specifies air units will not be parceled out to other units. However a more searching analysis discloses that the group is *not assigned* to the armored division and no control is exercised by the commanding general of the division. The group is simply *cooperating* with this particular division in the destruction of a common enemy, and the inherent flexibility of the air unit is not impaired in any way in as much as control is still vested in the air commander who may shift the weight of his effort in any direction as he views the over-all needs of all ground units as presented by his co-partner, the Army Commander, and from the air standpoint as he knows it. *The fighter group is not committed irrevocably to the support of the armored division.*

Both armed reconnaissance and column cover were the results of a situation that allowed no possibility of pre-planning on specific targets. The speed of advance of twenty to thirty miles per day, often in erratic spurts made the marking of a bomb line an impossibility. This, coupled with the fact that there were no organized and coordinated defense lines, but only isolated local strong points, made evaluation and selection difficult and practically useless in view of the speed of advance. These two factors made it necessary to depart from the system of allocating the bulk of air power against preplanned targets.

Armored column cooperation allowed for the greatest latitude and preserved the flexibility of the aerial striking force. The armed reconnaissance planes ranged far in advance and on the flanks of the armored force preventing movement both to and from the battle area as well as providing timely information as to enemy movements, and preventing his concentrating for either a stand or a counterattack. The aerial covering force moved at the same pace as the armor, keeping a constant vigil overhead to ward off enemy air attacks and assist in the detection and destruction of any enemy ground forces.

As both enemy aerial and ground resistance was reduced, the role of the two forms of armored column cooperation became more and more alike and entirely flexible and interchangeable.

Thus, in spite of a situation in which detailed joint planning was precluded by its very nature, both the Army and the Tactical Air Command maintained its system of close integration in the actual action through delegation of this all important team work to individual tank crews and airmen.

Intelligence Training

Lieutenant Colonel Joy R. Bogue, *Field Artillery*
Instructor, Command and Staff College

PARAGRAPH 38, FM 30-5, states that Military Intelligence Training in all echelons of command will include instruction in the collection, recording and evaluation and interpretation of information of the enemy, the terrain, and meterological conditions, and the dissemination of resulting intelligence; in counterintelligence; and in measures taken to prevent the enemy from influencing our action by propaganda.

Principles

The principles of intelligence training are the same as those prescribed in FM 21-5 and TM 21-250 for all military training and include preparation, presentation, application, examination and discussion. Since the product of intelligence training is more or less intangible, the principles of military instruction must be strictly observed to obtain the desired results.

Purposes

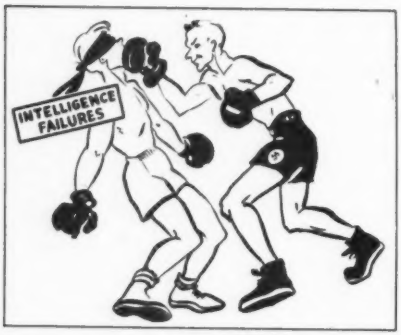
Before any commander, no matter how high or low his rank, can successfully carry out his assigned mission, he must know what he is up against. The commander will always receive some intelligence from the headquarters that assigned the mission, but the vital information must be obtained on the ground by the commander's reconnaissance agencies, and it must be processed and disseminated as military intelligence. Therefore the purpose of intelligence training is to insure, prior to combat, an efficient performance of intelligence duties by every soldier, from the front-line scout to all intelligence personnel of all echelons, and including unit commanders. We train an army so that it will be successful in combat. Since in the accomplishment of his mission, the commander may be required to make basic and supplementary decisions, usually based on the intelligence produced within his unit, the purpose of intelligence training becomes increasingly clear. Each time the commander makes a decision, he stakes his professional reputation on the soundness of that decision. He will become widely, and either favorably or unfavorably, known on the basis of his decisions. Therefore, no other military training merits greater attention. Most command failures, are, in the final analysis, intelligence training failures. Skim over lightly, or adopt an attitude of complacency, or weaken intelligence training in any manner, and you weaken the fabric of the whole military structure. Sound intelligence within a unit is the result of sound and effective training.

You may have great physical endurance, you may know all the tricks of ducking and shifting your weight, you may have the best gloves and equipment in the world, and you may have the "will to win"; but determine for yourself—can

you win blindfolded? The purpose of intelligence training is to remove the blindfold.

Scope

What do we mean by "Scope of Intelligence Training"? This is a broad term and we could cover it by stating that military intelligence training should encompass theory and practice in every conceivable situation the unit or agency might encounter in combat. Let us analyze



You can't fight blindfolded.

the scope of intelligence training within an infantry division. First of all, we should divide the division personnel into three groups; the first to include all intelligence section personnel from battalion to division headquarters; the second to include all reconnaissance agencies, the reconnaissance troop, the intelligence and reconnaissance platoons of each regiment, the intelligence section of each battalion to include the engineer and medical units, and the reconnaissance agencies of the organic artillery; the third group includes all personnel from the division commander to the newest replacement.

Now, what are the differences between the three groups of personnel and their required intelligence training? First of all, where do they work, and what are their individual duties and responsibilities? The first group is concerned with the collection and processing of information, the dissemination of intelligence, with counterintelligence and defense against enemy propaganda; so, its training should include instruction in the seven basic subjects indicated in paragraph 38, FM 30-5. The duties and responsibilities of the second group are to collect information. Their intelligence training must include an intensified course in collecting information, supplemented by practice in observation, scouting, sketching, preparation of messages, and communication methods. In addition, since their missions will take them into enemy territory, they must be thoroughly trained in counterintelligence and defense against enemy propaganda. The third group is perhaps the most difficult to train. Since every soldier is a potential source of information, and likewise a potential leak of information and a fertile field in which to plant enemy propaganda, it is then logical to conclude that each soldier, regardless of his rank, must be trained to collect information, to conceal (counterintelligence) information from the enemy, and to understand enemy propaganda. Therefore, intelligence training within a division does not end with the training of intelligence section personnel, but does require specialized training for every soldier according to his assignment.

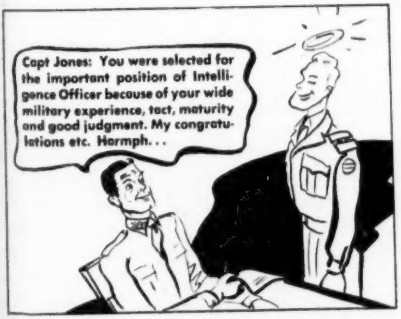
Within the scope of intelligence training comes the selection of personnel for the intelligence sections, and the reconnaissance agencies. It may seem trite to emphasize that only the best personnel should be assigned to intelligence duties. But an analysis of their responsibilities and missions, and the important contribution which sound intelligence makes to the success of the command, justifies any commander in carefully selecting intelligence personnel. Of course, the G-1 and G-3 and G-4 will run competition

for the best personnel, and they rightfully should, but this competitive spirit must never reach the point of jeopardizing the success of the whole command. By the best personnel, we do not mean supermen. We mean soldiers that have been well-trained in the basic military fundamentals, men with good physique and health, men with initiative, men that are resourceful and energetic, men with maturity and good judgment. In other words, men you can depend on in tight places. Insuring their *exclusive* assignment to intelligence duties is one of the problems with which every commander and his intelligence officer is faced.

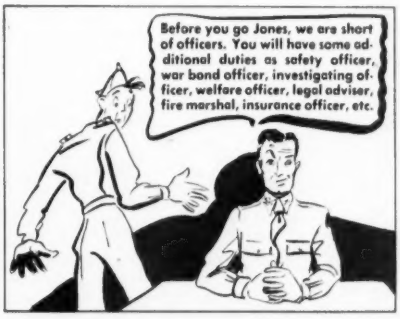
If you will accept an example of how this worked out in combat the following may be of interest. A regiment embarked on an amphibious assault over a distance of approximately 400 miles, and left the S-2 in command of the rear echelon. His secondary duties, in the eyes of the regimental commander, outweighed his primary responsibilities. The efficiency of the regiment in combat need not be mentioned, but the fact that the regiment had three commanders in three days may be enlightening. These facts are disturbing, more so, because they happened in 1945.

Methods

What are the methods of intelligence training? The methods are those prescribed in TM 21-250 and include preparation, presentation, application, examination and discussion of subjects. The subjects are those prescribed in the scope of intelligence training. After the intelligence training schedules are prepared and approved, then must come energetic and continuous inspection of training with close supervision. Probably no other military activity offers such a wide range of opportunity for initiative, ingenuity, and resourcefulness as the direction and supervision of intelligence training. One effective method is the detailing of assigned intelligence personnel on temporary duty at the next higher headquarters. This is applicable from battalion to army headquarters, and provides each successive headquarters with a reservoir of trained personnel. Another innovation, successfully used by many enterprising units, was the promotion of intelligence training through specially prepared cartoon posters. Daily bulletins, if carefully edited, provide a good vehicle to carry promotional matter. Since the whole intelligence training program should be directed toward developing an "intelligence consciousness" throughout the unit, many variations from normal training may be used as an adjunct to the regular schedules. Caution should be exercised


Capt Jones: You were selected for the important position of Intelligence Officer because of your wide military experience, tact, maturity and good judgment. My congratulations etc. Harmph...

Selection of Intelligence Officer.

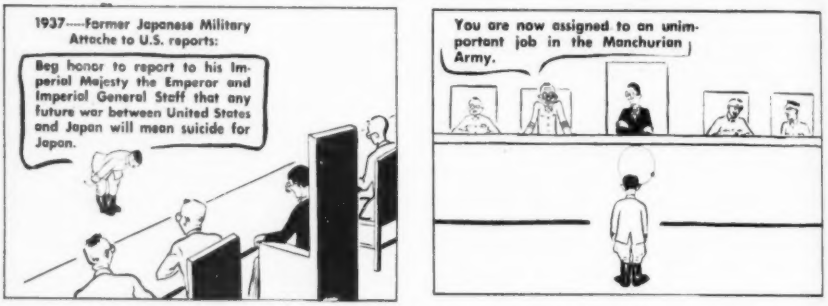

Before you go Jones, we are short of officers. You will have some additional duties as safety officer, war bond officer, investigating officer, welfare officer, legal adviser, fire marshal, insurance officer, etc.

But this too often happened.

so that the extra methods may not supplant the regular schedules. Contests of written essays can be rewarded as the commander sees fit, and at the same time they serve to stimulate interest in the training activities.

Intelligence training is a difficult field in wartime, but doubly so, in peacetime. The results of intelligence training are intangible, and therefore, some commanders were reluctant to devote sufficient time and attention to this training. Even passably satisfactory intelligence training requires time and patience. Thorough indoctrination in any military subject is a slow process, but more so with intelligence training. You cannot feel intelligence; you cannot see, hear, or taste intelligence. But its importance manifests itself when you need it most—in combat. Some commanders may believe that once in combat all they have to do is "turn the spigot" and intelligence will gush forth; that will be so only for the far sighted commander who had prepared for combat with adequate time and energy devoted to intelligence training.

SUCCESS OR FAILURE DEPENDS ON YOUR INTELLIGENCE


1937—Former Japanese Military Attache to U.S. reports:
Beg honor to report to his Imperial Majesty the Emperor and Imperial General Staff that any future war between United States and Japan will mean suicide for Japan.
You are now assigned to an unimportant job in the Manchurian Army.

This actually happened. They believed what they wanted to believe, not the intelligence produced by their intelligence agencies.

Responsibility

Training manuals state that intelligence training is a responsibility of command. Therefore on the division level the division commander is responsible for such training. What are the responsibilities of G-2, in regard to training? G-2 is responsible for the training of the G-2 section and the general supervision of the training of all subordinate intelligence sections. In this as well as in the matter of intelligence training for all personnel, close coordination with G-3 is necessary. But you will find the G-3 anxious to work with you. He is just as anxious for success in his work as you are in yours. The more and better intelligence that can be obtained within the division, the easier will be the work of G-3, and the better the opportunities for success of the unit in combat.

The division commander may delegate certain *authority* to G-2 in connection with intelligence training, but his *responsibility* cannot be delegated. Since the division commander is responsible for intelligence training and all other activities as well, he must have one officer to do his "pick and shovel" work in intelligence. This officer is the G-2. The G-2 will advise and recommend, or if

directed by the Chief of Staff will act for the division commander in all training matters pertaining to intelligence and counterintelligence. Since intelligence functions and intelligence will play such an important part in the command decisions, the G-2 must merit the full confidence of the division commander. Intelligence training failures during the planning and training phases can grow into an avalanche of disaster during the operational phase.

Now that we have analyzed the principles, the purposes, the scope, the methods, and the responsibility for intelligence training, we come next to the practical application. First all, what is our mission? Let us analyze it in detail:

1. To make every soldier intelligence minded and to develop a "will" to send work back.

2. To inculcate within every soldier the "know how" and the desire to observe counterintelligence procedures.

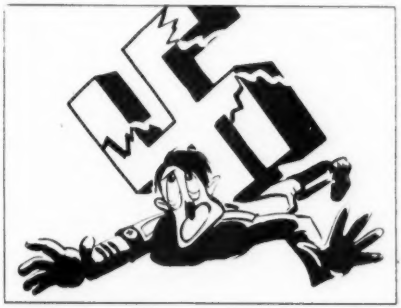
3. To so educate every soldier, that enemy propaganda will be nullified.

4. To train the reconnaissance agencies so that they may operate successfully in every conceivable situation.

5. To train all commanders and intelligence personnel so that information will be received, collated, evaluated, interpreted, and military intelligence disseminated promptly, in addition to the training indicated in the four previous subparagraphs.

After your unit is properly trained it will be inspected to determine its fitness for combat. When your division is suitably trained for combat it may be assigned to an army. The army commander will want to know, among other things about the status of intelligence training. When an Army representative comes to inspect your intelligence training he may use this approach: after visiting with your G-2 a short time he may get his little black book and say, "By the way, I have a poor memory, and I would like to make a roster of all your S-2s with a little background about each." "What is the name of the S-2, 1st Battalion of the so and so regiment?" If the G-2 says, "That's Bill Smith, who has been

Results of intuition.



This person declined to accept the intelligence produced by the German General Staff, and decided to base his decisions on intuition. You know what happened.

S-2 of that battalion for eleven months, and I have a lot of confidence in Bill. You see, he established quite a name for himself throughout the regiment as one of the best company commanders." But, on the other hand, if the G-2 says, "Sergeant, what's the name of the S-2 of the 1st Battalion?" and then turns to the inspector and says, "They change S-2s down there so often I cannot keep up with them," then the inspector, or even you, could form reliable opinions concerning what may be expected, from an intelligence viewpoint, when the unit is committed to combat. The moral is, the G-2 should know personally every S-2, and all key intelligence personnel.

During the late twenties, and thirties, intelligence activities in the United States Army were at very low ebb. Usually

intelligence assignments were considered less desirable assignments, and intelligence duties as such were negligible. During this period most officers were "studying the art of war" to a greater or less degree. Opinions were being established in the minds of company commanders.

CANNED!

Complacency, the little imp on the general's shoulder, is waiting the opportune time to remove the stars.

Most of them realized the importance of intelligence, but they did not appreciate that they were responsible for producing it. Later, during the war, many of these company commanders attained general officer rank and were given command of divisions. Some took these opinions with them, and as a result, the War Department found it necessary time and again to issue letters, training circulars, and other matter to bolster intelligence training. During combat, we learn quickly from experience. The lessons that we have been taught in this last war must become part and parcel of every officer. Now is the time to adopt correct military opinions, and to retain them throughout our military careers. We must not neglect intelligence training in the future.

In analyzing intelligence training, its principles and purposes, scope, methods, responsibility, and its practical application, it is hoped that this article may help you avoid complacency. Lack of interest, or complacency, is the greatest training evil to overcome within your command. If you remember nothing else but the vital necessity of creating an "intelligence consciousness" throughout your command which will result in an understanding by every soldier of his intelligence responsibilities, your biggest intelligence problems will be solved, and the chances for the success of your unit in combat will be materially increased.

If we had had a pool of trained manpower in the intervening years (between World Wars I and II) no two nations would have dared stirred us up and we probably would have never been involved in the recent war.

General Peyton C. March

American Liaison Groups

Colonel Henry M. Spengler, *Coast Artillery Corps*
Instructor, Command and Staff College

DURING the war, the assistance given the Chinese Army in China by officers and men of the American Army Ground Forces was unique, not only in the scope of assistance given, but in the methods used to achieve the desired results. Since in any future war or emergency the United States may be called on to furnish aid to allied countries in a manner similar to that used with the Chinese, it is desirable to review the organization, functions, and methods employed.

To provide a background, a short summary of the events leading up to use of American Ground Force personnel in China is necessary. In 1937 Japan had begun its war with China. During the years 1937 and 1938 when the Japanese were moving to close all of China's sea ports, China lost its best trained soldiers and a large quantity of its even then scarce equipment. In 1941 the Magruder mission was sent to China. Shortly after the United States declared war on Japan, Gen. Stilwell arrived in China to command the newly organized CBI Theater, act as Chief of Staff to Generalissimo Chiang Kai Shek, and later to be Deputy Commander, Southeast Asia Command. Through these first two positions, Americans were given the mission of assisting in the improvement of the combat efficiency of the Chinese Army, and American ground force personnel were brought to CBI in large numbers. A part of this personnel remained in India to work with the Chinese Army which had gone to India after the 1942 Burma Campaign. Training there was conducted in training centers. In China, because of the larger area and number of Chinese units, this training method was impracticable. It is with the American personnel employed in China that this article is concerned.

Let us examine first, the general plan for the use of this American personnel. American authorities early realized that to assist in improving the combat efficiency of the Chinese Army, new equipment must be issued and American personnel must be permanently assigned to the various Chinese organizations and units which were to receive American equipment. This was necessary so that training (particularly in American weapons), and combat and logistic operations might be continuously supervised and observed, and advice for improvement given to the unit commanders. Due to the shortage of rations and poor billeting conditions, the Chinese at first desired that Americans not be permanently assigned but make only periodic visits to units. Later this opinion changed to favor the American plan.

Concurrently, studies were made to determine the exact type and amount of American equipment to be issued to Chinese units and the functions, organization and equipment of the American groups or teams to be assigned to these units. Although this article is concerned only with the composition, functions and equipment of the American liaison groups it must be stated here that it was not until a joint revision of Chinese Army and Division Tables of Organization was accomplished that American equipment was distributed and employed.

After it had been determined that Americans would be permanently assigned to Chinese units, it was next necessary to reach an agreement as to the exact functions of the American groups. The agreement finally settled upon gave the American teams the following functions:

a. Assist in conducting officer and enlisted specialist schools.

b. Assist in planning, and supervision of unit training.

c. Assist in planning, and supervision of combat operations.

d. Assist in supervising supply, evacuation and transportation matters.

From the above one might get the impression that the Americans were practically to take command of the Chinese unit to which assigned. This was decidedly not the case. The Americans were to act only as advisors to the Chinese unit commanders, and this is how it worked out in practice. In the early phases, on American request, Chinese officers from higher headquarters were assigned with the American teams to see that all concerned understood the Chinese-American relationship.

Having decided the functions of the American teams their organization soon crystallized. For each division receiving American equipment, there was to be an American group consisting of a group commander, S-1, S-2, S-3, S-4, headquarters commandant, signal officer, medical officer, veterinary officer, six infantry officer instructors and sufficient enlisted personnel to serve as radio-operators, assistant instructors, clerks, and medical technicians, a total of approximately twenty-seven officers and men. Army teams to work with army headquarters and to supervise division teams had, in addition to the personnel listed for a division team, an ordnance officer, additional officers as staff assistants, and enlisted motor vehicle operators and mechanics. Army group teams to work with Chinese Army Groups Headquarters and to supervise army teams were similarly organized but included as additional personnel a finance officer and an artillery officer. Each American equipped artillery battalion (initially one per army, later one per American equipped division) had a small American team of four officers and five enlisted men. These teams were to be attached to the American team of the division or army to which the battalion was assigned. American portable surgical hospitals and units of field hospitals were assigned to army group teams to work with Chinese medical units of the army group, army or division. Armies and divisions which were not to receive American equipment sometimes were scheduled to have small American groups assigned for operational purposes. This plan was approved by the Chinese.

The organization of the teams settled it was then necessary to provide a table of equipment for each type team. First a modified table of equipment was drawn up to provide for individual equipment allowances. Since the equipment and material to be used for army group schools was that which later was to be issued as unit equipment, it was not necessary to include this as part of the team equipment. With these two provisions the team equipment was narrowed down to contain only office equipment, housekeeping equipment, motor vehicles, and motor maintenance supplies. Expendable training supplies such as ammunition, explosives, etc., were authorized by special training allowances.

The general plan for team operations was to be as follows: Upon arrival of the Chinese Army Group the team, with the cooperation of the Chinese, was to conduct a series of schools within each army for both Chinese officers and enlisted men. The schools consisted of a one-month school in weapons and minor tactics for infantry officers, a fifteen-day school in weapons for noncommissioned officers stressing the weapons with which the en-

listed man's unit was to be armed, a sixty-day school for medical officers, a thirty-day ordnance school in the maintenance of weapons, a veterinary school for horse shoers, a forty-five-day signal school for wire, radio and message center personnel both officers and enlisted men. The schools were to run concurrently and be repeated until all of the officers and noncommissioned officers of the infantry regiments and sufficient technicians had been trained. After the school phase was to come unit training, initially planned for eight weeks' duration and later lengthened to twelve weeks. After this training phase (schools and unit training) which totaled four to five months, the unit was to be ready to engage in combat operations. When the Chinese unit entered combat, the American teams were to accompany the unit and assist in operational and logistic matters.

The above plans approved, the first American teams were sent out, and joined their Chinese units in late August and early September 1943. Although the prior plans were generally followed, as can be expected, many modifications had to be made. First, the number of American personnel available for assignment was so inadequate that initially, for the school phase, all teams of the army group had to be consolidated. As more personnel became available this was changed to conform with the original plan. Second, the Chinese Armies occupying defensive positions could not make available at any one time, sufficient student personnel or units for unit training to meet the four to five month deadline in which all training had to be completed. For these, unit completion dates had to be moved back. Third, the number of Chinese interpreters was insufficient. It was found that during the training phase, each officer required an interpreter and this was also true in approximately thirty per cent of the cases of enlisted men. This problem of interpreters became so important that Theater Headquarters soon took over the function of procuring interpreters and alloting them to the various major commands.

By 1 May 1944 four armies, although they had not completed the planned training, were considered sufficiently trained to be used in mounting the Salween offensive which ended in January 1945 with the clearing of West China and the juncture with the Chinese Army in India. Throughout the entire operation, American team personnel directed artillery fire by air spotting, operated air-drop fields, acted as tactical air control parties, interrogated prisoners, furnished medical support, and gave advice in tactical and logistical matters. It must be again stated that all the assistance was given through appropriate Chinese channels, and that Americans at no time commanded Chinese units.

During the operations phase the following lessons were learned: First, teams that were just adequate in size for training were to large for operations. This was due largely to the limited resupply facilities available once the unit left the road, and the fact that most of the instructor personnel were in excess. This overage was adjusted by transfers to other units still engaged in training. Second, the supervision of logistic matters, both Chinese and American, took a far greater percentage of the teams' time and personnel than was first realized. It finally developed that American groups had to be organized to work with the Chinese truck regiments and later, when more American truck drivers and trucks became available, American SOS took over the responsibility for all motor transport. Where there were no roads, air resupply was necessary, requiring ground force team personnel to be used at air-drop and landing points.

As time went on more and more American teams were sent out to carry on similar work with Chinese Armies and Divi-

sions. By July 1945 sixteen armies and over fifty divisions had American personnel attached.

The article would not be complete without a description of the American headquarters which controlled all these American groups. Initially it was called Headquarters "Y" Force and worked with the Chinese Expeditionary Force Headquarters which commanded all Chinese Army units in southwest China. Later, when the China Theater was established, "Y" Force became Chinese Combat Command and worked with Supreme Chinese Headquarters, which commanded all Chinese Army units in western and central China south of the Yangtze River. During both periods the functions of the American Headquarters were the same. It assisted the Chinese to formulate policy, prepare operations and administrative plans and supervise their execution. As an American headquarters it handled the administration of the American personnel under its command.

The following then, is a summary of the procedure used to employ American ground force personnel in China: First, the decision was made as to which Chinese units Americans were to be employed with and for how long a time. Second, the functions of the Americans with the units were determined. Third, the size of the teams and their equipment was established. Fourth, the plan for use of the teams upon joining their units was made. Fifth, the administrative plans for the support of the teams were made. After one, two and four, above, were approved by the Chinese, the teams were sent out to work with the units.

As mentioned in the introductory paragraph, American personnel may in the future be sent to some allied nation to render assistance of a nature similar to that rendered the Chinese. If so, the experience gained in the solution of the many problems in organization and procedure confronted in the China Theater might be found of considerable value in solving the problems involved in any future undertaking.

There is no shortcut or easy path to lasting peace. Effort and sacrifice are essential. A determined will and the strength to enforce it are demanded. The weak have no assurance of peace. They can only accept what is permitted them. But those who are strong, both in the justice of their cause and their will to defend it, can assure the world freedom from war.

Hon. Robert P. Patterson, Secretary of War

MILITARY NOTES AROUND THE WORLD

GREAT BRITAIN

Faster Than Sound

Experiments in flight at supersonic speeds, which may have an important bearing on the future development of British aircraft, are shortly to be carried out on behalf of the Ministry of Supply.

Before the end of the month Vickers-Armstrongs, makers of the Spitfire and Wellington aircraft used by the RAF, will deliver to the Ministry the first of twenty or more pilotless machines which have been designed for a speed of between 800 and 880 miles an hour. The first robot machine is now being completed at the company's Weybridge works.

All the machines will have bi-fuel rocket motors fed on *T-Stoff* and *C-Stoff* chemicals which the Germans used in their V-2 rockets. The aircraft will be of the same size, about twelve feet in length with a wing span of only eight feet, but the size and shape of the wings and tail surfaces will be varied so as to test the behavior of the different aircraft under the influence of compressibility, the condition encountered when approaching sonic speeds.

The robot aircraft will be tested in flight over the North Sea. Mosquito aircraft fitted with special attachments for carrying the small pilotless machines will release the rocket-driven aircraft from a considerable height.

The whole of the robot's flight will occupy only about a minute, but during that time a telemeter, a device which records the readings of all the instruments, will transmit to a ground radio station details of the aircraft's performance. The aircraft will also be tracked by radar.

(*The Times Weekly*, London)

New Naval Training

Development of electrical equipment in the Navy during the war, especially in radio and radar, has led to a new branch being created for its maintenance and development, and the Admiralty has adopted a new system of training for the officers. They will be known as "L" Branch officers, and will spend three years as undergraduates at Cambridge, and will be apprenticed to electrical manufacturing industries during the university vacations.

Officer candidates for the "L" Branch will be accepted once a year from boys between seventeen and nineteen who have taken the higher school certificate, with mathematics and physics as main subjects. They will become naval cadets and will spend their first year in general naval training, chiefly in the training cruiser to which cadets of all branches are sent. They will go to Cambridge for a three-year course equivalent to that for honors degree. Their rank will then be Midshipman (L), but they will not wear uniform. If satisfactory, they will be promoted to sub-lieutenant at the end of their second year. On leaving the university, they will have a further two years' training, partly at sea, partly at a naval electrical school, and partly with firms manufacturing naval electrical equipment.

(*The London Times*)

GERMANY

Germany Lost 1,064 Major Ships

The U.S. Navy released the information that a total of 1,272 German and Italian naval vessels were destroyed from all causes in World War II. In addition, 204 German and forty-nine Italian ships surrendered. The total German and Italian ships destroyed include 994 German U-boats and 116 Italian submarines. Of these, 217 Nazi and seventeen Italian submarines were scuttled by their crews after the German and Italian surrender dates.

The German Navy lost six battleships, three pocket cruisers, one incompleted aircraft carrier, three heavy cruisers, four light cruisers, fifty-three destroyers and torpedo boats, and the 994 submarines. Two gunboats, the *Bremse* and *Brummer*, also were sunk.

Battleships lost were: *Bismarck*, *Tirpitz*, *Gneisenau*, *Scharnhorst*, *Seblesien*, and *Holstein;* aircraft carrier *Graf Zeppelin;* heavy cruisers *Admiral Hipper*, *Seydlitz*, and *Blücher;* pocket battle cruisers *Admiral Graf Spee*, *Admiral Scheer*, and *Lützow;* light cruisers *Emden*, *Karlsruhe*, *Köln*, and *Königsberg*.

Of the 994 U-boats lost, 354 were destroyed by aircraft, 246 by surface ships, 217 were scuttled by their crews, forty-nine were destroyed by surface ships and aircraft, thirty by mines, twenty-one by Allied submarines, forty-nine by other causes not determined, and twenty-eight from unknown causes.

The Germans surrendered three cruisers, thirty destroyers, torpedo boats, and old torpedo boat tenders, 181 submarines (of which 151 have been scuttled by the British), forty-eight depot ships, and 1,679 fleet auxiliaries and small coastal craft. These 1,789 naval craft have been divided among the Allied nations as follows:

	To U.S.	*To Britain*	*To Russia*
Cruisers	1	0	1
Destroyers and torpedo boats	7	13	10
Submarines	10	10	10
Depot ships	12	21	15
Other auxiliaries	560	612	507
	590	656	543

The 6,000-ton light cruiser *Leipzig*, partly damaged at the end of the war, was scuttled at sea by the British. She was the sole remaining major warship afloat that had not been allotted to any of the victor nations.

The British also demolished at Kiel, the partly wrecked battle cruiser *Admiral Scheer* and heavy cruiser *Admiral Hipper*. Both warships had been badly damaged by Allied aerial attacks on Kiel Harbor. *(Seapower)*

JAPAN

Thermal Power Plants

A complete equipment inventory of Japan's largest thermal power plants, including data on production capacity, specifications for turbines, and other equipment has been compiled by U.S. Army Headquarters in Japan and published in five reports by the Office of Technical Service, U.S. Department of Commerce.

Japanese thermal plants represent about two-fifths of Japan's capacity to produce electric energy, according to the report. Geological and geographical conditions in Japan favor the use of water resources for power production. Oil is practically absent, and domestic coal production does not meet industrial needs. As a result, hydroplants carry the basic power load, while thermal plants carry most of the peak loads.

(The Military Engineer)

CANADA

Canadian Arctic Defense

Recent conferences participated in by the three chiefs of staff of the Canadian armed forces have been interpreted as dealing with Arctic defense and future cooperation with the United States and the United Kingdom.

As far as it has ever been publicly defined, the Canadian position with regard to Arctic defense may be summarized as aiming first at keeping war away from Canadian territory; second, cooperating with United Kingdom as Canada did in the last two wars in supporting the principles of individual freedom and the democratic system of government; and third, working in harmonious partnership with the United States in hemisphereic defense.

The Canadian position on Arctic defense is that outposts in that region are essential, but they should not be so large as to seem to threaten any other hemisphere. The outposts on Canadian territory must also be purely Canadian, although the presence of friendly observers would not be excluded, the government holds.

On the other hand, it is recognized that Canada always will be prepared, in the event of danger to this hemisphere or to the British Commonwealth, to throw her territory and forces into the common cause.

(Ottawa dispatch to the New York Times)

UNITED STATES

Task Force Frigid

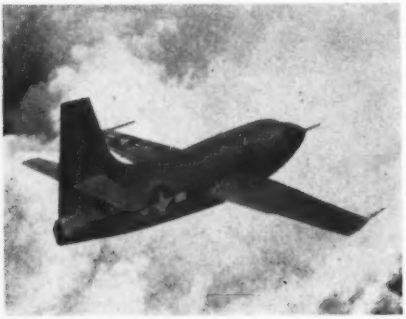
"Task Force Frigid" has been undergoing an intensive training program near Ladd Field, Alaska, which will end 30 April 1947. Army Ground Force personnel in two similar task forces are engaged in similar training at Camp McCoy, Wisconsin and Adak, Alaska. Army Ground Forces chose the Fairbanks site for "Task Force Frigid" in order to subject equipment to extreme, prolonged Arctic cold. Snowfall up to five feet deep

can be expected here, and blizzards are frequent during the winter months. The equipment tests will establish the suitability of our weapons for cold weather operations, and will provide data for development of better weapons for this type of warfare.

(Bureau of Public Relations release)

XS-1, First U.S. Rocket Plane

Product of a cooperative program between the AAF, Bell Aircraft and NACA, the Army Air Forces has its first true rocket plane, the 1700 mile-an-hour XS-1.



Described in simplest terms, the XS-1 is an extremely powerfully built airframe driven by a mighty rocket engine developing 6,000 pound thrust. Remarkably enough, considering all of the futuristic plans and diagrams drawn by artists and engineers of their conception of supersonic craft, the XS-1 is actually very conventional in design. Though highly streamlined, as can be seen in the two photos, the use of swept back wings has been avoided. NACA states, however, that various wing designs incorporating knowledge gained by experience with the test model will be tried later.

XS-1 engine power is supplied by a thrust engine which consists of four units, burning alcohol and liquid oxygen, each of which produces a static thrust of 1,500 pounds, developing a total engine thrust of 6,000 pounds. Pilot controlled, the number of cylinders to be fired rests with the pilot. Consequently, a power output of 1,500, 3,000, or 4,500 or a full 6,000 pound thrust may be used at his choice.

The length of the airplane is thirty-one feet, and, from ground to tail-top, it measures ten feet, ten inches. Compared with other AAF aircraft, the XS-1's wing-span is extremely short—only twenty-eight feet, with a total wing area of 130 feet. Unloaded weight of the craft is 4,892 pounds, 526 pounds of

which is test equipment. The rocket fuel weighs 8,177 pounds, which is more than one and one-half times the weight of the empty plane. The over-all weight of the fully loaded XS-1 is 13,069 pounds.

(Army and Navy Bulletin)

Army Shows Off Weapons

A view of the Army's new weapons, including a ninety-eight ton tank which has relegated the forty-six ton "General Pershing" to medium tank status, and heavier recoilless weapons and aircraft machine guns, was given the Army Ordnance Association, high Army officials, the entire staff and student body of the Armed Forces Industrial College and newspapermen at Aberdeen Proving Grounds, Md., late last year.

So rapid is the rate of ordnance development that some of the arms publicly shown for the first time already are superseded by still newer weapons.

Spotlight at the show was taken by 195,000-pound super-heavy tank (T-28), which has double tracks to support its enormous weight. The super-heavy mounts a 105-mm gun. Intended for close range assault operations, the monster was originally designed to crack Germany's west wall.

Super-heavy Tank, T-28.

The Pershing (M-26) which went into action in Germany early in 1945 as the Army's heavy tank, has been reclassified as the standard medium tank of the Army—its forty-six tons being dwarfed by the new T-28 and T-32.

M-26 "Pershing."

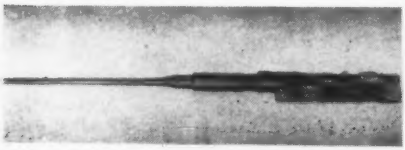
A new development of the Pershing, however, also is being tested and made its first public appearance at the demonstration. This modification, the T-26E4, mounts a 90-mm high velocity gun in a turret considerably larger than that used on the standard vehicle.

M-22 "Locust."

Going to the other weight extreme, the Ordnance invented a light, light tank, the "Locust" (M-22), designed for airborne use.

New swimming devices designed to permit tanks and self-propelled guns to go to land under their own power from distances off shore were paraded at Aberdeen together with the well-known "Weasels," "Ducks" and "Alligators."

Striking evidence of the rapidity of arms development was the simultaneous showing of two aircraft machine guns, the M-3 caliber .50 and the T-17E3 caliber .60.



Caliber .60 machine gun, T-17E3

The former delivers 1,200 rounds per minute as compared with the 800 of its predecessor, the M-2, although it weighs only one and one-half pounds more.

In the recoilless field, the Army took the wraps off its 105-mm T-19, which is fired from a light-weight two-wheel towed carrier. This weapon can be broken down into pack or parachute loads thus giving both foot soldier and paratrooper artillery support.

This 105-mm joins the two earlier recoilless weapons, the 57-mm, which can be fired from shoulder or bipod, and the 75-mm, which can be fired from a machine-gun tripod.

In addition to the familiar 2.36-inch Bazooka, Ordnance showed for the first time the more powerful, slightly heavier 3.5-inch M-20 rocket launcher, which can be fired from shoulder or tripod.

The modified 60-mm mortar (M-19) and the new 81-mm motar (M-21) were shown for the first time. Both mortars incorporate a trigger firing mechanism

81-mm Mortar, M-21.

to increase safety. The M-19 is really a combination of the old 60-mm standard and jungle weapons. The old base plate is retained, together with the bipod, but a smaller base plate and separate sight are provided with each weapon for use in jungles or confined spaces. No bipod is needed for the smaller base and alternate sight.

60-mm Mortar, M-19.
(Army Times)

FOREIGN MILITARY DIGESTS

Westkapelle

Digested by the MILITARY REVIEW from an article by Major W. R. Sendall, in "The Navy" (Great Britain) November 1946.

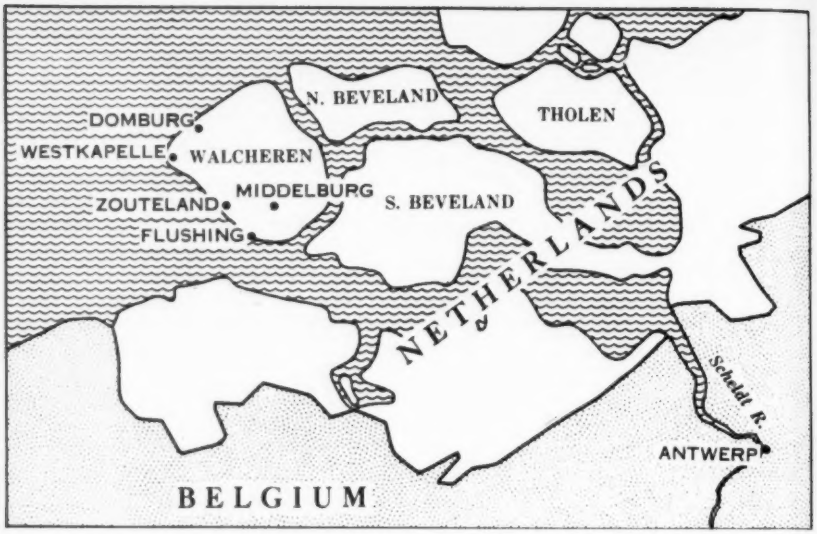
THE famous action in which the 4th Commando Brigade stormed the batteries of the great Weskapelle Dyke in Walcheren was not only the climax of the Royal Marine effort in Northwest Europe but one of the most extraordinary battles of the whole war. It was extraordinary because it was, in a curious sense, old fashioned.

Ringed by its dykes and sand dunes, into which the massive batteries of the enemy had been built, the island of Walcheren resembled, on a large scale, a fortress by Vauban. The unarmored support craft engaged the batteries point-blank to cover the landing in a manner which cannot fail to recall Nelson's immortal instruction—"No captain can do wrong who lays his ship alongside the enemy." Supported by their fire, the Three Royal Marine Commandos literally went into the breach in the old style, the breach being the great gap torn in the dyke by the bombers of the RAF.

The ensuing battle was fought out on the ramparts, the narrow strip of dyke and sand dune between the sea and the flooded interior of the saucer-like island. There was no room for finesse. The victory was gained by good organization and intestinal fortitude. There was no escape for the enemy, who could only stand to his guns or surrender. Equally there was no scope in the limited terrain for outflanking maneuver or surprise. Each battery was a separate, self-contained bastion, which had to be carried—bluntly—by gunfire and courage.

The 4th Commando Brigade was divided for the occasion. Number 4 Army Commando was employed as spearhead to the Lowland Division in the assault on Flushing. At Westkapelle the forces were the 41st Royal Marine Commando, the 47th Royal Marine Commando, the 48th Royal Marine Commando, a detachment of an Allied Commando, assault engineers, Canadian medical personnel and pioneers.

The first wave of the 41st Commando beached on the dyke itself in LCIs. A pillbox was spraying bullets along the glacis and the section commander was killed. A sergeant took charge and went straight for the pillbox, his tommy gun blazing, pausing only to throw grenades. Single-handed he killed or captured its occupants. The flight (wave) commander directed his men to seize positions covering the wrecked village of Westkapelle. The first footing seized, subsequent waves landed in amphibians, 41st Commando north, and 48th Commando south of the gap in the dyke. To the north, the 41st cleared the village and to the south, the 48th drove the enemy from the ruins of a big radar station. Not until both shoulders of the breach were in our hands did the big guns of the German batteries lift from the



The Scheldt Estuary—Walcheren Island.

supporting naval squadron to concentrate on the landing, but then they had the range exactly and poured shells into the restricted beach area. Amphibians loaded with ammunition were hit and exploded as they tried to maneuver through the hugh bomb craters, minefields, and obstacles, while through this inferno the 47th Commando came ashore.

The first battery to fall was W-15, just north of Westkapelle. A sortie of Typhoons, taking advantage of a slight improvement in weather, assisted HMS *Warspite* to silence the big W-17 battery further north at Domburg.

48th Commando tried to rush W-13, the first of the southern batteries, but the Germans met them resolutely, breaking up the attack with heavy mortar concentrations. Supporting fire from HMS *Roberts* and from the concentrated artillery south of the Scheldt estuary at Breskens was called for. Finally the Typhoons made a shattering attack on the concrete gun casemates, and the marines went in again, slithering and slipping in the soft sand as they struggled up to the wire. Not until nightfall was the battery subdued.

Meanwhile, the 41st Commando followed up their success against W-15 by pressing furiously along the dyke towards Domburg. In the late afternoon they drove the enemy, badly shaken by the relentless pounding of HMS *Warspite*, from battery W-17 and entered the blazing village. Darkness and thick woods north of Domburg prevented the pursuit being pressed further.

Soon after dawn next morning, 48th Commando pushed along the dunes southwards and drove the enemy from the village of Zouteland, after which 47th Commando took over from them to press on to the last of the big batteries that commanded the approaches to the Scheldt. Here the dry land between sea and floods was a little broader, but the approach to the battery was covered by a broad antitank ditch, dragon's teeth and mine-

fields. A double attack was planned, one thrust against the German positions at Klein Valkenisse in the low-lying ground, the other along the crest of the high dunes against the battery itself.

The first attack crossed the ditch but came under concentrated mortar fire in the open and suffered severe casualties. The attack along the dunes covered nearly a mile of soft sand, through a maze of wires and mines, all the time under heavy machine-gun and mortar fire. It was a terrible experience, the high wind lashing up a spray of sand that blinded the Marines and clogged their automatic weapons. Two troops following up also suffered heavy casualties on the open sandhills. Fierce hand-to-hand fighting followed in the edge of the defenses, but the Germans counterattacked and drove the marines out of their lodgment.

Night was falling, and the three troops were isolated on the dunes with a strong gale blowing a veritable sand storm around them. Ammunition was running short and the wounded could not be got back, while casualties to signallers made communications with headquarters difficult. All the troop commanders were themselves casualties. Under cover of darkness the position was reorganized. Food, water and ammunition was manhandled up over the steep sand slopes. The wounded were carried back. A strong night attack by the enemy was beaten off, and the ground gained was held as a base for a further effort in the morning.

Next day a tremendous concentration from the massed batteries was called down on the defenses. After this terrific hammering, the assault was resumed across the bare slopes. The Germans fought desperately, pouring a withering fire from their machine guns. Then came a bayonet charge up a steep sandhill to break into one of the main positions. From this foothold the marines pushed on remorselessly, through a maze of communication trenches and underground passages, driving the enemy before them. The German resistance cracked at last, and the advance swept forward rapidly through the battery and beyond, till at dusk a second gap in the dyke just north of Flushing was reached. On the far side could be seen the green berets of Number 4 Army Commando, who had fought their way north to meet the marines.

Next morning the first minesweepers of the Royal Navy went in to sweep the estuary up to the great port of Antwerp.

The battle of the dyke was won, but it still remained to clear the enemy from the north of the island, where they held out in the woods beyond Domburg. This was not accomplished without some sharp fighting, but the enemy position, caught between the Commandos and the men of the Lowland Division, who had crossed the causeway from South Beveland to take Middleburg, was hopeless, and they soon surrendered *en masse*.

The battle of the dyke was fought for a naval objective, to open up Antwerp for our shipping, and as such takes its proper place with Gibralter, Belle Isle, and Zeebrugge, in the records of the Royal Marines.

The first requirement to be a military leader, is to know thoroughly one's specialty and the second, to be loyal to one's subordinates. Both conditions will save one from mutual disloyalty.

Simon Bolivar, quoted in *Revista de Caballeria* (Chile)

Evolution of Future Warfare

Translated and digested by the MILITARY REVIEW from an article by General Lopez Valencia in "Ejército" (Spain) October 1946

Prophecies on War

It is easy to prophesy war, which according to the classic euphemism, is nothing more than the continuation of a policy through other means. When the security systems (international laws, League of Nations, Peace Tribunals, treaties) established to reconcile conflicting interests fail, the continuity of life in the world requires the use of violence.

Prophecy of war is not based solely on appreciation of current events, examination of international forces, or geographical conditions. The thing that really determines war is human nature itself.

In the future there will be war, just as in the past. But if it is easy to foretell the existence of war, it is not easy to forecast its form, methods and character. The effort to explain this enigma might lead us to a fantastic Utopian concept, because impressionable and untrained minds can easily fall into the habit of building a Utopia based on atomic energy, radar and super planes. The study of a human problem as difficult as war requires more seriousness and calm judgment.

Our task is to try to foretell the form and the nature of future wars. If we consider the future as a projection of the present, we might be able to foretell the form of future objects.

Economic Outlook

Since, in spite of our materialistic civilization, the world cannot do away with its spiritual anxiety, we must reject the idea that economics is the exclusive cause of war. Future wars might be ones of national revindication, of self-defense, of political expansion or of spiritual liberation. But it is undoubtedly true that in every case, wars of this nature are linked to economic motives.

The economy of the future, forcefully directed and "satisfied," will be universal in character and consequently will complicate international relations, for the policies pursued by different nations will be to establish themselves in economic sectors where they can compensate their deficiencies in war as well as in peace.

Geopolitical Factors

Isolationism can no longer exist. The economic, political and ideological affinities will determine international relations and will inevitably create other determinants, strategic in character, that in periods of tension will undoubtedly replace the former. The principal duty of political directors will be to recognize strategic values that will give groups or political blocks their greatest advantages.

Mechanized War

Mechanized war will probably be the field of great human effort in the future. We need to examine the evolution of the means of warfare, understanding at the same time the value of the material means of war and the way they can be utilized by the ingenuity of man.

With the end of World War II, many of the mechanical advances in armament and means of warfare had ceased to be technical surprises. The motor, as the basic factor of the offensive maneuver; the tank, as a powerful means of penetration; aviation, as the universal means of carrying out all missions; radar and radio location, the acme of security and precision; jet propulsion, which increases the velocity and ascending power of the air arm, are all incorporated into the means of warfare. There are still some mysteries such as utilization of atomic energy, which some persons claim will be fully explained soon.

With these means, and admitting that they will be improved, we can supply all future arsenals.

We must not expect greater precision or firepower in weapons, greater speed in maneuver or greater explosive power, but it will be difficult to "condense" the number of fire pieces or to try to obtain weapons adaptable to all tactical missions. The more perfect and complicated the mechanism, the greater will be the intervention of man in constructing, directing, moving and repairing the machines of war.

New Modes and Old Principles

This appreciation of the mechanics of the means and men of the future leads us to the necessity of accepting—although only in a just measure—the influence of matériel on tactical doctrines. It is necessary to begin the formulation of doctrines without longing for old traditional schemes.

We have also seen how the improvement of the material means of warfare definitely affects the fundamental philosophical principles of the art of war. One of them is the liaison between the fighter and the terrain.

Experience teaches us that a war vehicle cannot yet be built that we can say operates in all kinds of terrain. Almost always the full efficiency of a weapon requires a special situation, under favorable circumstances. When this is achieved, the effects are powerful and devastating, but this is rarely achieved.

In the war of the future, the terrain will achieve an importance even greater than now. The best defense against tanks and planes will be provided by the terrain. The best fortifications will not be those built out of reinforced concrete, but those built by geological forces thousands of years ago. As far as we can foresee, the total surface of the planet can be divided into possible theaters of operation, and the special concept of war, and consequently of terrain, also will occupy primary importance.

Characteristics of the War of the Future

War Ideals.—The men of the future, physically and spiritually similar to those of today, will be surprised by a general mobilization and forced to go back to war, at least to defend their high standard of living. They will fight an *economic war.*

Other human forces that have made their appearance or will appear in the future will launch a constitutional war, moved by the cohesive forces of race or nation.

Peoples that have not been satisfied in their imperialist aspirations will search in a future of conquest to satisfy their aspirations by continuing to expand.

Total War.—Armies of the future will be integrated by huge human masses, because:

1. It will be a total war, intensive and extensive at the same time, and

2. The variety and perfection of the means of warfare will require more men to manufacture, transport and guide them. Industrial machinery, instead of reducing the number of laborers, has created numbers.

War Groups.—Ideological, political, economic and strategic interdependence leads nations to a system of war relationships annd allows the existence of blocks or unions of opposing interests which, in the absence of human solidarity based on Christian justice and morals, will force them into war.

War of Matériel.—The elementary forms of war evolve with matériel. The war of matériel will improve in quality, variety, and potence, and to this we must adjust our tactical and operational doctrines.

War of Maneuvers.—The maneuver, which was not eliminated by static war, will not be eliminated either, by atomic, radio-electric, and jet propulsion war.

The tendency to establish an equilibrium in the industrial means of nations forces them to try to overcome this equilibrium through maneuver, thus opening a field for the speculative fighting of a war.

Paradoxes of Ultramechanical War

The progress achieved in the fields of mechanics, mining, explosives, motors, air navigation and radio lead to a super-mechanical civilization and to the dictatorship of industrial technique. Courage and intelligence will still hold first place in the means of warfare. The combination of man and terrain, representing an indestructible union, will be opposed in the mechanical age to an industrial technique which seems to be all-powerful.

Operation "Dusty"

Digested by the MILITARY REVIEW from an article by Flight Lieutenant K. R. Ames, in "Royal Air Force Journal" (Great Britain) January 1946.

FOR some weeks intelligence parties had been following false trails up and down Germany in search of the remains of the *Oberkommando der Luftwaffe*, the German Air Ministry organization. Eventually it was tracked down in the Austrian mountains, some miles from Zell-am-See, part of the much-discussed "Redoubt". Goering had disappeared, leaving in command General Ritter von Greim, who in his turn had been taken to a hospital complaining of stomach ulcers. This condition he alleviated by taking an overdose of potassium cyanide. General Koller was then left in sole charge, and with the remains of his staff moved from Berchtesgaden into the Tyrol.

A team, consisting of fifty per cent U.S. AAF personnel and fifty per cent RAF, set out to track down the General and his *Oberkommando der Luftwaffe*. We prepared for weeks of search. We expected to find the remains of the organization widely dispersed. We dared not hope that the whole organization would turn up in one parcel, neatly wrapped and labeled.

Within a matter of hours we had loaded two jeeps into a C-47, thrown in a good reserve of field rations and flown to Salzburg, driving from the airfield down the smooth, wide highway which leads so incongruously to the small town of Berchtesgaden. But for one small *chalet* on the hillside, Berchtesgaden would be one of the most inconspicuous villages in southern Germany, and would certainly have no claim to the broad *autobahn* which leads to it.

The following day our liaison officer drove down to the isolated *gasthof* (inn) near Zell-am-See and discovered there a situation which, at that stage, seemed quite incredible for a surrendered country. He walked right into a nest of nearly four hundred fully-armed Germans, including the whole of the General Staff with a total of some seventy officers, all of them strutting around still carrying their revolvers, wearing highly-polished boots and sporting full displays of decorations. A little bewildered at the set-up, he asked to be shown to the Chief of Staff, General Koller. The officer was somewhat disturbed at receiving unannounced visitors so early in the day, and make no attempt to conceal his feelings from the squadron leader. The suggestion that American troops would be brought in to take control of the camp was considered by Koller to be quite impracticable. "It would interfere with the smooth running

of the unit!" he said. Similarly, the disarming of his personnel, he maintained, would be quite out of the question as it would then be difficult to preserve any form of discipline among the men! The squadron leader came away from the rendezvous more dumbfounded than ever at the inability of the German mind to grasp the situation.

At the conference that evening it was decided that two truckloads of airborne troops should be sent down early in the morning to round up these "unsurrendered" troops and bundle them off to a prisoner of war cage. The airborne troops were to disarm the guards, and intelligence personnel of the RAF and the U.S. AAF were then to search the inn and outhouses for files and documents. The transmitter station which sent out vital messages to the German forces right until the last day of war, was to be taken over. Officers of the General Staff would be detained for interrogation.

That was the plan. Next morning, in torrential rain, we set out and halted outside the inconspicuous *gasthof*. We surprised the guards. The guards surprised us; we did not expect to see them there. The airborne troops had not arrived—they had lost themselves in the sixty miles of confusing tortuous roads of the Alpine country, where a downpour of rain had turned visibility into nil.

Consequently, it was left to a handful of RAF and AAF officers and enlisted men to set the whole of the *Luftwaffe* General Staff packing; to get them all out and on the road with their cooks and clerks, their drivers and their defense troops to drive their convoy of broken-down motor transport over the mountains to the camp at Berchtesgaden.

The disarming was easy and amusing. Privates and corporals, captains and generals surrendered with little difficulty. When the position was explained to General Koller by our senior officer there was a great deal of shouting, gesticulating, saluting and heel-clicking. For, when a German general becomes excited, he immediately sends his subordinates running in every direction and airs his opinions in block capitals.

Eventually the situation was ironed out and the inn became a howling bedlam with generals of all vintages, colonel and other lesser breeds darting about like rabbits, collecting their personal belongings and bundling out through the steady downpour into the waiting transports. All arms were collected as they passed through the door.

Their adieus completed, the *hausfrau* turned all her *Gemuetlichkeit* on the new visitors. She announced that a hot meal would be ready in ten minutes for the "*Herren Englander und Amerikaner.*" For her and her husband it was merely a change of *clientéle* and the business had to go on regardless of wars or surrenders.

As the tail of the last truck containing the staff of the German Air Ministry disappeared down the narrow lane, we were all ransacking the area for documents. Among our finds were a couple of scientists, whom we discovered in one of the attics with their library and experimental equipment; they were experimenting on atom splitting. These "back-room boys" insisted they they haa "no connection with the firm next door." They were not, they said, "Air Ministry" types. Nevertheless, a new home was found for them.

Thus was the German Air Ministry finally routed out from a dirty, lonely Alpine inn and put behind the wire—a long call from the once-impressive white stone edifice in the center of Berlin which had once been their home.

Polar Expeditions

Translated and digested by the MILITARY REVIEW from a French article by the French Army Scientific Bureau in "Revue des Troupes Coloniales" (France) October 1946.

SINCE the end of World War II, two important events have held the attention of military circles: the Bikini experiment and Operation Muskox in the Canadian Far North.

Operation Muskox drew the attention of military writers to a part of the world that has hitherto been spared by war—the Arctic regions. Their geographic situation and their climatic characteristics appeared to render these icy wastes unfit for normal human existence. Nothing would have given rise to the thought that they could become a theater of military operations if the advance of modern science and industry and international politics had not made these already mysterious countries the object of a silent but positive competition between the two greatest powers on earth.

Their Strategic Interest

During World War II—Only a few years ago the Arctic continent could be considered as unexplored. The neighboring and almost uninhabited lands, without exploited economic resources, also seemed outside the civilized world. World War II imparted to these regions an appearance of activity, owing to the necessity for rapid communications between the U.S.A. and the U.S.S.R., and drew pioneers to them. By 1941, the Canadians had constructed a chain of airdromes from Edmonton to Fairbanks, Alaska. At the close of 1942, it was decided to double this aerial route by a land route designated as "Alcan." In temperatures of -30° in winter and torrid heat in summer, 10,000 soldiers and 4,000 natives constructed a highway 15 meters wide and 2,700 kilometers long. It was necessary to overcome many obstacles. The work was carried on through forests, over marshes, rivers and mountains.

Then, in order to reach the Russians and deliver to them all sorts of supplies, the Americans established a series of airdromes forming the "Alsib" line. These bases permitted transport planes to carry on regular service from Alaska to Siberia across the Bering Strait. It is practically impossible to imagine the unbelievable difficulties and the many problems connected with such a project. Men spent months isolated from the rest of the world, telegraph and telephone communications being frequently interrupted by magnetic storms while airplanes were frequently unable to land on the chaotic or storm-swept surface and were obliged to parachute supplies. When the war ended, these installations opened new perspectives. The American authorities decided to encourage settlements in Alaska while increased exploitation of the riches of the ground became possible.

Military importance of the northern polar zone—The evolution in methods of warfare immediately attracted the attention of the American and Russian governments to this part of the earth. The frightful effects of the atomic bomb were immediately tied in with the radius of action of bombing planes and guided projectiles. In a press conference on 6 August 1944, General Arnold, Chief of the United States Air Force, announced that the 10,000 kilometers of the B-29 were already passed by a bomber whose radius of action reached 25,000 kilometers or more than half the circumference of the earth. The round trip against a target situated at a distance of 10,000 kilometers was thus assured. General Arnold announced, moreover, that flying bombs had been tried out which were guided by a plane which followed twenty-five kilometers behind. Geographical considerations

added to these considerations of a military nature suffice to render evident the exceptional strategic importance of the north polar regions. As a matter of fact, nearly all of the world's industrial wealth (steel, coal, oil, factories engaged in the manufacture of mechanical equipment), are located in the neighborhood of the 45th parallel of north latitude. The 50th parallel passes practically through the English Channel, Belgium, the Ruhr, Silesia, the Donetz, Magnitogorsk, Vancouver and Winnipeg, while the 40th parallel passes through Chicago, Pittsburg, Philadelphia, Madrid, Bakou, Turkestan, Peking and crosses Japan. Now, the 40th parallel is located 6,500 kilometers from the pole and the 50th a distance of 4,500 kilometers from it. Thus, the Arctic route places the world's riches, though located in opposite hemispheres, a distance of 10,000 kilometers from each other.

Strategic aspect of the Arctic—A flight across the polar regions is, today, commonplace, and renders possible surprise attacks, whence the interest certain powers appear to have in installing there a series of bases provided with antiaircraft weapons as well as a radar network. Among these new positions we may note the Tamyr peninsula in Siberia and Victorialand in northern Canada. Only 2,400 kilometers separate these two ad-

Peace River Bridge—Alcan Highway. (Signal Corps Photo.)

vanced portions of land, and passing across the pole, the industrial centers of Portland and Seattle are only 5,000 kilometers from the Tamyr peninsula while Magnitogorsk, capital of the Russian steel industry, is only 6,000 kilometers from Victoria-land. The United States already possesses a series of bases around the polar circle: Fairbanks, Alaska, Julianehaad in southern Greenland, Reykjavik in Iceland (this island was not evacuated by the American forces at the conclusion of hostilities although it is a sovereign state, owing to the fact that it is on the right wing of the American disposition). It appears, however, that in the domain of the exploration and exploitation of the Arctic territories, the Russians possess somewhat of a lead. It is, in fact some years since their meteorological explorers and geologists traveled over the Polar seas with perfected equipment, in expeditions that have now became famous. The number of observation posts possessed by the U.S.S.R. in these regions is estimated at some 300, while Canada has ten and the United States hardly as many.

Maneuvers of the United States Navy in the northern waters—Last spring the staff of the United States Navy directed a series of maneuvers in order to try out the employment of naval vessels and armament under the rigorous conditions of the far north. A light squadron left Norfolk on 1 March and headed for the Polar seas through the Davis Strait between Greenland and Labrador. The world's most powerful airplane carrier, the "Midway," of 45,000 tons, and three fast destroyers participated in the expedition. They sailed through the icy seas around Baffin Island over a radius of some 1,000 kilometers. The 2,500 men of the crews had to face temperatures of as low as -40° (Centigrade) and fight against blizzards. Among the fifty-eight planes which were on the "Midway," were Curtis "Helldiver" fighters, a jet-propelled plane and a helicopter. Equipment of the most highly perfected type and special detecting apparatus were tried out. Although the orders given to Rear Admiral Cassady, who directed the maneuvers, have not been revealed, it is thought that the purpose of the operations was to determine precisely whether a modern battle fleet could operate with maximum efficiency under the atmospheric and meteorological conditions of the Arctic regions. They served, likewise, to determine the technical means for overcoming the difficulties inherent in these regions. The latest information received appears to indicate that the planes were able to take off and land easily at temperatures as low as -30° (Centigrade) and that jet-propelled planes, particularly, found conditions excellent for operation at very low temperatures.

The "Midway" expedition must be followed incessantly by increasingly important maneuvers participated in by numerous surface and underwater craft.

The Muskox Expedition

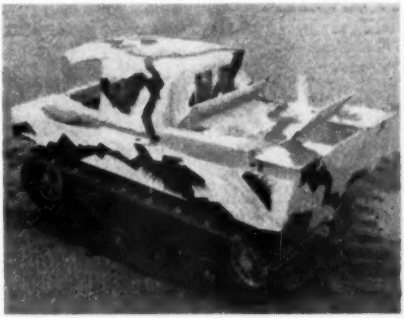
Equipment—The equipment employed had been chosen on the basis of a possible landing in Norway, an operation in which the Canadians were to play a leading role. The expedition comprised fifty men and about a dozen vehicles. These vehicles, the "snowmobiles" or "penguin tanks" employ broad caterpiller treads which permit them to travel over ice and snow-covered ground. Built of ply-wood, duralumin and glass, they weigh but four tons and leave less of a trail on snow than a man on foot. The cabins are insulated against the cold with weather-proof glass over apertures. In spite of this, however, the temperature inside them remains but little higher than that on the outside. Each "snowmobile" is able to carry five men at a speed of fifty kilometers per hour and pull a trailer containing "Jerricans" filled with gasoline, a nylon tent, five sleeping bags, six

caribou skins for the ground, a gasoline stove, a lamp, tools, cooking utensils, food rations for a week, and a rifle.

The men were provided with special equipment. They wore seven thicknesses of fabric over their bodies: a knitted undergarment (serving as insulation between the skin and the second undergarment), a thick flannel shirt, a high collared sweater, a battle-dress, a double vest of wool and knitted fabric, an overcoat lined with otter fur and provided with a hood. They wore, in addition, two mufflers, one of ordinary wool, the other similar to the material of the knitted undergarment, three pairs of mittens and overmittens. Their feet were protected by two pairs of socks, felt boots and a pair of large boots such as are worn by the Eskimos. Lastly, goggles and masks protected them against the extremely low temperatures.

Itinerary—The fifty men left Churchill, a little town on Hudson Bay on 14 February 1946. A few days before, thirteen men had gone to Baker Lake, 800 kilometers north of there, and installed a meteorological station. It was from this point that planes took off on skis to carry supplies to the expedition. The expedition first headed northwest in the direction of Denmark Bay, 450 kilometers inside the Arctic Circle, the northernmost point to which it was to go. It crossed the frozen strait which separates the continent of North America from Victoria Island, then it continued around the north side of the gold fields located near Great Slave Lake in the direction of Fort Radium where the greatest deposits of uranium in the world are located. From there, it passed close to the oil fields west of Great Bear Lake. It headed after this in the direction of the Fort Nelson base, passing to the west of the regions that are rich in lead and zinc. It arrived at Edmonton on 6 May 1946. It was twenty-four hours late on the basis of the planned schedule. The last 150 kilometers were covered by railroad. The treads of the vehicles built for snow, slipped in the mud caused by the thawing weather and it was necessary to load the vehicles on flat-cars at Fort Nelson, the northern-most railway station.

Organization and life of the expedition—The food question had been the object of special study, in order that the



"Snowmobile" as used in Operation "Muskox." (Signal Corps photo.)

men might have 5,000 calories a day, where from 3,000 to 4,000 suffices in our climate. Supplies were brought to them by air. Every three days, a special squadron of "Dakotas" and "Norsemen" located the column and dropped down the necessary food, provisions and supplies. These provisions included fresh as well as preserved foods, but all had to be thawed before consumption. Thanks to the use of radar, the expedition was able to signal to the aviators and receive their packages of supplies with an error of less than 400 meters, even in cloudy weather.

Each evening the twelve vehicles halted, and the men set up their tents, after having covered the ground with caribou

skins. They slept completely naked in their sleeping bags which sealed them in hermetically, the zipper fasteners leaving but a small opening for air for the men to breathe. When blizzards were blowing, the men abandoned their tents and slept in igloos which they constructed, themselves, of blocks of snow.

The expedition had to conquer cold, blizzards, and mud. It had to cross rivers swollen with half-melted snow. It had faced the dust of Alaska which is more formidable even than the snow of the far north. In these desolate areas, the "snowmobiles" made a maximum speed of twenty, but more often, of only ten miles per hour. The average distance covered in a good day's travel was fifty miles. The hardest experience of the expedition was when the vehicle which led the way, hit on a trail which had not been used for some two or three years and which was blocked by snow slides. Once the men had to work sixty-four hours to clear 200 meters of the path.

Results of the Expedition

The results of the expedition were considered very satisfactory. The "snowmobiles" rendered possible the attainment of extraordinary traveling speed for these regions. Thanks to their equipment, the men did not have to suffer from the cold, and the nylon tents formed perfect shelters at night.

In stormy weather, orientation became difficult since compasses were of little use in these regions so close to the magnetic pole, and radio transmission was affected by the aurora borealis. In spite of this, however, radio and radar permitted them to keep on the correct course. The chief of the expedition, Colonel Baird, professional geologist and Arctic explorer, praised his men and was satisfied with the collaboration of the Eskimos who never attempted to make away with any of the parachuted supplies.

From this expedition we learn that cold is no longer an obstacle to military operations in the polar regions.

A Surgeon in Guerrilla Warfare

Digested by the MILITARY REVIEW from an article by Geoffrey Parker, in the "Journal of the Royal Army Medical Corps" (Great Britain) September 1946.

CIVIL and guerrilla warfare alone constitute "total war," with all its hideous implications. Here there are no "rules" except those of the jungle. Torture and death is the fate of all prisoners, wounded or unwounded. Enslavement, torture and death is the rule, too, for the family of any man or woman who dares to lift a hand against an occupying army. Guerrilla fighting, therefore, attains a degree of bitterness which is unknown in classical warfare, except during those rare moments of hand-to-hand fighting.

The next points of difference are in the matter of the composition of a guerrilla force, its morale and its discipline.

The causes of such a force vary in each component individual. Simple unquestioning national patriotism, political hatred of the enemy's way of life, a desire for vengeance for atrocities committed on loved ones, and, rarest of all (and the least reliable source of inspiration), a spirit of pure adventure. Each individual fights by reason of his or her convictions or from necessity. However the causes may differ, the mass effect is the same: a force which is quite unconquerable so long as it lives, not only collectively but as individual men and women. The high morale of these people is something which has to be lived with to be appreciated.

So long as there is work to be done and enemies to be killed, the tireless and irrepressible courage of these ragged patriots made me think many times of Tolstoi's axiom that wars are won, not by preponderance of guns, nor even by brilliant generalship, but by the fighting of the soldiers engaged.

Lastly, the question of discipline and its maintenance is a factor with which morale is intimately linked. Orders are given, for the most part, by word of mouth. There can be, therefore, no fine grades of obstruction to, or evasion of, orders received. Either an order is obeyed or it is defied, and so, accordingly, "field punishment" is reduced to its simplest and grimmest forms. Immediate execution was sometimes threatened, though rarely resorted to, except for acts of cowardice or treachery. Dismissal from the force was sometimes ordered, and this might well mean an indirect death sentence since the dismissed man could no longer rely on the protection of numbers of his compatriots about him, and stood a good chance of being picked up by the enemy who would treat him as a guerrilla. He was left to survive, if he could, in a land where the hands of foe and former friends alike were turned against him.

In a preceding paragraph I have described the secret of maintenance of discipline, as I saw it practiced by our own "Chief" in France, Colonel Roman, a Frenchman of prodigious energy and fantastic personal courage of which I was a privileged witness on more than one occasion. He rarely gave us, or the enemy, a day's nor yet an hour's peace.

An active guerrilla force is well disciplined, but a period of idleness is even more disastrous to it than it is for a regular force. The keen men are bored and frustrated, and so drift away to more active units in other parts of the country; while the poorer types, whose motives for being in the irregular force are often mixed ones, will swagger round in idleness, recounting their past deeds of valor, drinking too much, and displaying their arms, more for the appreciation of the local women than the destruction of the enemy. Such a force, when again put suddenly to the test of battle, will disintegrate completely in a matter of hours.

Our Chief's policy was therefore one of perpetual movement, and often in this intention it must be said he was assisted by the attentions of the German occupying forces. As soon, however, as the attacks slackened off, acts of sabotage and assaults on the enemy lines of communication were at once organized, and so a busy time was had by all, and little opportunity for the demoralization of idleness. The morale of the men, therefore, was kept constantly at a very high pitch. The Maquis were completely irrepressible, and it was a perpetual tonic to be with them. No opportunity for making jokes of their own misfortunes was allowed to pass. At times this effervescence bordered on the hysterical, but this was only at particularly desperate moments, and for the most part it was entirely spontaneous and genuine. A remarkable phenomenon in a group of men and women who fought without hope of mercy if captured, and who knew that the very fact that they were there at all was an automatic death sentence, not only for themselves but also for their families, if they were identified.

This preamble has a direct bearing on the work of a surgeon who finds himself engaged with a guerrilla force. In the first place, he must try always to be on the spot where the actual fighting is taking place, and this may well be difficult when unexpected contacts with the enemy occur in widely separated areas.

The effect on the morale of these irregular fighters of the presence of a few men or women with even the elements of medical training is entirely out of proportion to the actual medical serv-

ices that they may be able to render to the sick and wounded. This is fortunate because, generally speaking, the medical services can only be of the simplest kind, and might be classed as "high grade first aid." Of course, the fighting men know this, nevertheless, it is just one more small barrier between them and death, and it means much.

In the second place, there is no such thing as "evacuation of the wounded" in a guerrilla army. The medical man must be prepared to carry his cases about with him, or hide them securely in the forest country, if any, or in the cellars of remote farms, where loyalty to the cause is unquestioned. Even in these hide-outs he must continue to feed, water, and treat his cases, as no one else not actually involved with the guerrillas will dare to do so for fear of reprisals on themselves and their defenseless families.

In the third place, the medical man must be prepared to fight in defense of his wounded and of himself. He does not wear a uniform, and he must carry arms and use them. He is, therefore, violating international law (whatever that may mean), and he and his patients will die together if they have the misfortune to be captured. This is not the place for discussion or comment on the ethics of all this; but the above are facts which must be taken into consideration if this type of medical work is to be well done.

I have tried in a few words to give a picture of the "material" on which the guerrilla surgeon will find himself at work, and come now to a more detailed study of purely medical considerations.

The first questions that a doctor must ask himself when setting out for this type of warfare are, "What shall I take with me?" and "What shall I find to use when I get there?" The answer to the first question is "Nobody knows better than he does, even if nobody knows less," and to the second "Nobody knows at all."

In dealing with these questions myself, I made the following plans. I divided my medical equipment into two groups: the first consisted of the maximum of bare essentials, that, at a pinch, I could carry on my own back in a highly mobile war "on the run," and the second consisted of the maximum that they would allow me to take in the plane which was to carry me to my destination.

The load to be carried in a rucksack on the way consisted of:

1. One canvas surgeon roll (American pattern). A superbly well thought-out set containing about forty stainless-steel instruments (including a small ophthalmic set) with which it was possible to do any major or minor surgical operation that might be encountered in war.

2. Metal spools carrying 100 feet of linen thread and silk for ligatures.

3. 200 one-gram ampoules of pentothal sodium.

4. 200 compressed shell dressings (regulation pattern).

5. 100 grains of morphine sulphate in ¼-grain tablets.

6. Two pounds of sulphanilamide tablets (to be crushed up for local application) in two light metal containers.

7. Fifty packets of compressed wool (to be used as "sterile" swabs) for operating.

8. One 10 c.c. all-metal syringe and needles.

9. One spare shirt and two pairs of socks and mending material.

In addition a .45 Colt and fifty rounds, and a dagger (commando pattern) were carried, and to this was added a small automatic rifle and 200 rounds on arrival in France.

I had no time to do a trial loading before leaving England, and when it came to the point of actually carrying this, I found myself defeated by the bulk rather than the weight, and had to part with 100 ampoules of pentothal, 100 shell

dressings and one pound of the sulpha tablets. Another man took charge of these for me, and in the confusion of a sudden retreat into the forest I lost sight of him and the stores for many weeks, but both turned up safely later on.

The "bulk" packing to be carried in the plane was limited in weight, as many other things such as explosives, ammunition, chocolate, cigarettes, etc., had to be taken and either dropped by parachute or landed with us. I limited myself, therefore, to half a dozen Thomas' splints (paratroop collapsible pattern), 500 pounds of Cellona plaster bandages, ten metal bottles of chloroform (ether was not permitted in the plane for obvious reasons), fifty pounds of carbolic soap, and twenty "first-aid sets." These latter were not "combat" packed, i.e., as separate units; some contained only instruments, others only drugs or dressings, etc., and they all had to be hastily unpacked and reassembled on arrival. When this was done, each set contained:

1. Three pairs of artery forceps.
2. One knife and one pair of dissecting scissors.
3. Six first field dressings.
4. Six packets of compressed wool.
5. Two ampoules of pentothal.
6. Ten grains of morphia in ¼-grain tablets.
7. Some sets had a metal syringe (5 c.c.).

Tourniquets were supplied with the sets, but I did not issue them as I think that they are a source of great danger in the hands of the semi-trained. These first-aid sets were for distribution to any medical students, doctors, and nurses whom I hoped to have work with me, and they proved of the greatest value in the later stages of my time in France.

It was my intention to distribute these sets, together with extra first field dressings, and plaster bandages, to the young medical students and nurses who were working with the Maquis, to be taken when they were operating with small groups of from five to twenty men carrying out isolted acts of sabotage, etc.

In actual practice nearly the whole of my "bulk stores," such as they were, were overrun by the Germans within four days of my arrival, though most of it was safely hidden and recovered later.

The area where I was working was heavily attacked by two and a half German divisions including some armored car units and two battalions of SS, so the Maquis broke up into small groups, and we ran for our lives into the forest, taking about eighty wounded with us. Nine of our wounded I failed to extract from a hospital before the Germans arrived; they were caught and executed under particularly brutal circumstances by the Wehrmacht.

As soon as possible, that is about nine days after this dispersal in the forest, code messages were sent to England for further medical supplies, together with antiscorbutic tablets (as I found a number of the younger Maquis suffering from minor degrees of scurvy). In due course these supplies, together with a number of other things, were dropped to us by parachute in the night in the mountains.

At this stage in the fighting, we only took with us such wounded as were incapable of doing anything for themselves, but were at the same time fairly mobile. The rest we hid in little groups of two or three, either in the denser parts of the forest or in remote farm houses. The latter was the more dangerous method, as there was the perpetual and very real risk of informers and a search by German troops, when, if the Maquisards were found, or indeed, any trace they had ever been there, the farmer and his wife would be executed and the farm itself razed to the ground.

The care of these widely separated groups of wounded was particularly dif-

ficult, and the half-dozen doctors, students, nurses, and I must, between us, have crept many hundreds of miles along the forest tracks at night to visit them every three or four days.

The surgical treatment of these cases might be described as an over-simplified form of the Trueta principle as he first described it during the Spanish civil war. All wounds were laid widely open and, when in doubt about an amputation, then an amputation was done. Possible late complications had to be cut down to a minimum, and neither immediate closure nor secondary suture was ever considered safe and practical owing to the difficulties of post-operative supervision. The sulpha drugs could be applied locally and given by mouth for a few days.

Plaster of Paris bandages were in very short supply, and I could use them only where there was a fracture complicating the wound. For strengthening, and also for economy in plaster, pieces of wood or small branches of trees were incorporated in the plasters and, in cases where the plaster casing might be easily visible, the surface of the casing was rubbed over with earth and leaves to camouflage the man when moving through the woods in daylight.

I found among the cases already wounded before I joined the Maquis, three cases of dropfoot. All three cases had been hit many weeks before I arrived, and their wounds were soundly, though untidily, healed. The cases presented a problem, however, because they could not walk and had to be supported or carried around wherever we went.

With the aid of an ordinary dog collar round the leg above the knee, connected to a wire loop through the toe cap of the boot by a piece of parachute cord and a rubber tourniquet, the footdrops were corrected, and within a week the two nerve injury cases were walking around unaided. One of them at once hobbled away to his unit to go on with the fighting.

The other two cases, together with a number of badly wounded cases, we took by night to the Swiss frontier, when the journey across country was fairly free from German troops. The Swiss Red Cross authorities very kindly took them off to a hospital in Geneva. Their safe arrival on neutral territory relieved me of a headache of many weeks' duration.

Abdominal wounds, in this type of warfare, carry with them an almost 100 per cent death rate, owing to the impossibility of operating under anything like proper surgical conditions. I was fortunate in having only one case of this sort due to enemy action. This man we managed to sneak down into the nearest town at night, where we operated on him in the local hospital which the Maquis "took over" under the noses of the Germans for the hour and a half required to get him to the hospital and to repair some small bowel perforations, do a colostomy, and open the rectal wound. The man made a good recovery and was looked after by the nuns at considerable risk to themselves until, about two weeks later, we again came down into the town and took him safely away to Switzerland.

To turn briefly now to other sides of the work. For the period that I was in the Maquis we were very fortunate with the weather. Glorious sunshine for most of the time, though of course we had to keep to the darker parts of the forest during the day to avoid being spotted by the reconnaissance planes which were constantly about. It often rained at night and, lying on beds made of branches, we got very cold and wet in the small hours of the morning; but usually we were up and moving by first light and so soon warmed up again. We had no cases of pneumonia, nor were there any complaints of the many minor af-

flictions of soldiers, during the periods of great activity. As soon as things got slack, everyone complained of everything, from colds in the nose to sore feet; but there were very few periods of inactivity.

Everyone was lousy and flea-ridden, and we could do nothing about it. We had a small quantity of soap with us, but for a period of nearly three weeks the Germans cut us off from our water supplies by putting heavy machine-gun posts to guard the wells, and during this most distressing period each man had less than half a liter of water or diluted wine per day. Every drop of this was needed for drinking, as climbing about in the mountains in the hot July weather, with a large rucksack on the back and weapons to carry, caused much sweating, dehydration and misery. We were reduced to trying to augment the daily half-liter by wiping the dew from the surface of the bracken with a rag and then sucking the rag. It took all the courage and example of Colonel Roman to keep up the men's morale at this time, and I think that I will remember it all my life.

It may perhaps not be entirely profitless to consider the best ways in which a surgeon might prepare himself for at least a few of the unpredictable eventualities of guerrilla warfare. Personal preparation should clearly consist of being extremely fit. "Toughness" is not a virtue, be here it is a necessity. Under famine conditions a fat man gets ill before a thin one, from acidosis due to rapid breakdown of his own fats, unsupported by the normal protein and carbohydrate intake. A thin man, on the other hand, too easily tires. Mentally, the Medical Officer must prepare himself for a life in which nothing ever happens "according to plan" and where the extreme limits of improvisation will be required of him. He must also be prepared not only to "bear arms" but he should be skilled in their use, so that he may give good account of himself should the necessity arise. Incidentally, he will get no respect or support from the fighting man unless he shows himself ready to play his part in this respect if called upon to do so.

So far as personal equipment is concerned, this must be the smallest and most compact. Apart from the clothes he stands up in, the Medical Officer should take an extra woolen shirt, two handkerchiefs, and a pair of leather gloves; this should be enough for three months. Socks are unnecessary; they soon ruck up with heavy climbing, and in any case, wear out too quickly. If the feet are in good condition and the boots a perfect fit and well greased, all will be well. I did not wear socks at all while in France, and often did not take off my heavy boots for many days and nights, as the danger of sudden attacks and the need to "get off the mark" quickly was always with us, and I had no foot trouble the whole time.

Anti-louse powder is more important than soap if there is a water shortage, though both should, of course, be carried. Soap, however, is bulky and heavy. A very light, quilted sleeping bag—alpine pattern—is a great comfort, but it should be so cut that it can be quickly shed if necessary.

Medical supplies should be of a kind which are unlikely to be found on the spot. Sterilizing apparatus is out of the question: neither the sterilizer nor the fuel for it will last very long, and any farmhouse can produce enough boiling water for the type of surgery which will be done with a guerrilla force. Swabs can be used and washed and boiled up over and over again if they have been well sewn up around the edges. Catgut is too bulky in practical quantities, and silk or linen thread spools can be re-sterilized repeatedly. Pentothal is probably the most portable and practical anasthetic, par-

ticularly as the type of emergency operation to be done rarely takes longer than twenty minutes. Morphia in tablets is less bulky than ampoules, and 5 c.c. all-metal syringes are essential.

Prescience of the local conditions, as well as individual preferences, will naturally suggest modifications both in the personal and "bulk" packing.

I think that any man—and there are a number—who had experience in this sort of warfare, will agree with me that, apart from the extraordinary medical experiences, a surgeon will come out of it better for having lived awhile with men and women who live and fight for their ideals, unmoved by political clichés and propaganda.

The Army in Time of Peace—Soviet Point of View

Translated and digested by the MILITARY REVIEW from a French article by First Lieutenant Henri Juillerat in "Revue Militaire Suisse" (Switzerland) January 1946.

THE end of a war creates a state of universal uncertainty. Economic relationships are upset, finances are in disorder, social relationships are strained, the whole rhythm of life is suddenly interrupted by the cessation of hostilities, and it becomes necessary to readapt to a new existence in order to avoid serious crises capable of affecting even the most absolute victor.

This "shifting gears" is not accomplished smoothly, and the army is affected as well as other institutions of the various countries concerned.

Not only industry must be "reconverted," but also the army must proceed without delay to its adaptation to the conditions of peace.

A prejudice born of war-weariness, constraints of military life, and a feeling of uselessness, provoked by an attitude on the part of the civilian population to regard the soldier as a parasite, impels the public to look upon the army as something that is no longer needed.

There is, in both peace and war, a definite, legitimate, and necessary position for the army. The idea is no longer entertained that a nation can give up its military forces in time of peace. Hence, the discussion has changed to the form this force should possess and the work it should accomplish.

The situation has been favorable, since the dropping of the first atomic bomb, for those who are hostile to the army to predict the complete disappearance of all the military concepts and put their trust in a little group of scientists and technicians who would hold the fate of the world in their hands. This subject has been debated by the Americans who are so far the sole possessors of all the secrets of atomic energy, and the chiefs of the United States Army have concluded that in spite of all discoveries the army is a permanent necessity.

The Staff of the Red Army has arrived at the same conclusions. In spite of the revolution occurring in the field of strategy since the revelation of nuclear energy, the armed forces of this great world power are not undergoing any profound structural modifications and there has been no belief that they could be done away with. On the contrary, the Red Army tends to continue in this effort with rigorous determination. We need, as proof, only an article which *Krasnaia Zvezda* recently dedicated to the role of the army in time of peace.

The Soviet publication first brings up

the matter of the post-war crisis which immediately threatens all members of armed forces: fatigue and lassitude, idleness and sterile contentment in victorious armies of occupation.

Before taking up the subject of the article itself, it is well to examine briefly certain aspects of this crisis that are manifested in our own case and in occidental countries in general, and to see also how they affect demobilized men. The exaltation of battle at an end, soldiers may fall prey to various feelings: rancor and bitterness at the continuation of their daily routine; revolt against the army which has snatched them away from normal life.

The case of the officers is particularly to be considered. From the lofty positions they held in the army, they suddenly find themselves civilians, often lowered in social position, incapable of returning suddenly to humble tasks. Or they find themselves without jobs or the opportunity of developing the qualities they acquired or revealed on the field of battle. *Krasnaia Zvezda* does not allude to the fate of demobilized men, although this matter is handled in a very satisfactory way in Russia. It is to the present army that the publication addresses its remarks. "Between the period of war and that of peace," the article states, "there must not intervene a period of complacent inaction." The lesson taught by history, of never resting on what one has acquired, is not contradicted by Stalin.

The ideas developed by the Russian publication may not be anything new and we certainly have not waited for their appearance in this publication to proclaim them here, but it should be useful to call attention to them just at this intermediary period through which we are passing. In dwelling on them, our aim is also to demonstrate with textual material that purely military experiences lead everywhere to identical conclusions.

From the very hour when hostilities cease, armies have an enormous task before them. War having introduced with each passing day some new subject to be put into practice even before it has been accurately defined, the task is now to coordinate all the lessons learned in battle, to estimate their value and possible applications, to institute new methods and to imbue them in the minds of the members of the armed forces.

". . . All information acquired becomes really utilizable only after being subjected to serious and critical study and assimilation by the troops."

There exists, however, danger of stagnation, and of being one war behind when the next conflict arises.

Krasnaia Zvezda forsees this and announces, as a rule: ". . . not to get behind, and to be able to follow the developments of military technique as well as those of military science as a whole. A break coming between the introductory and the perfected stage in armaments is paid for dearly afterwards. . . . Don't learn a code of action by heart. There exist no fixed rules nor are such rules willingly accepted by combatants. To be effective, our methods of assimilation of military experience must, above all, be free from routine, and the field must be left open to thought and initiative."

The doctrine that is to be applied is summed up, therefore, in these two words: experience and initiative. But what would happen with the preponderant influence of the officers? As far as we Swiss are concerned, the difficulties of civil life must not cause our officers to forget that their military mission continues, without material advantages, and perhaps without certain satisfactions relative to legitimate pride. Duty, however, is none the less definite and it must be learned that war is almost play in comparison with the breadth and diversity of the soldier's obligations in time of peace, and

the moral and intellectual discipline required of him.

Our military traditions, which are much older than those of the Red Army, do not permit our finding these teachings from the Soviet press too hard:

". . . The inculcation of new principles and methods of military training depend, above all, on the cadres of the Red Army, on the completeness and rapidity with which our chiefs adapt themselves to new conditions and understand their peacetime tasks.

"But, what is required of our remarkable officers and especially now, at the moment of sudden transition between war and peace, between fighting and training? It is indispensable that all the officers of the Red Army, without exception, become fully aware that the least break in the domains of military theory and training brings about inevitable delay on the modern field of battle. Those who tolerate such breaks are unsuited for the fulfillment of their duty as officers, under modern conditions.

"In 1920, immediately after the end of the Civil War, Lenin stated: 'It is not possible to create a modern army without science.' The very essence of the military profession requires that an army, even though it be a victorious army, as soon as hostilities are over, submit to hard, but profitable training, for fear of being outdistanced. And our Soviet officer must understand that it is a problem of the first magnitude and the equal of those in battle."

On a par with military training, *Krasnaia Zvezda* names as a duty of the army and its officers the raising of the level of the military and political training of the men. The Soviet training program cannot interest us here. But this does not mean that the principle is not correct. The Swiss army of militiamen is a great school of citizenship and must remain so. Tendencies have been manifested in our country in certain courses and schools to substitute, in place of the education of the man, development of his character, of his nobility, his sense of values, brutality, coarseness even, and physical aptitudes only. But it is time to come back to more salutary conceptions, for courage is not strength or technical skill or muscles, and no matter how advantageous it may be to possess them, they do not constitute intelligence or spiritual greatness.

The Soviets demand of their officers two essential qualities whose purpose it is to preserve them against mistakes and self-complacency: power of criticism and self-criticism, and discipline.

Criticism and self-criticism, "within reasonable limits" may be profitable. They prevent those who apply themselves from becoming submerged in pure theory and from drawing away from reality, fatal vices which lead to formalism, lethargy and numbness of the faculties. They prevent one from playing the role of Sir Oracle, from throwing out his chest, and permit one to take his task seriously, without necessarily taking himself too seriously.

"Certain chiefs appear to believe that their rank protects them from criticism. That opinion, however, denotes a fatuity which is absolutely inadmissible in the Red Army. Reasonable criticism, coming from comrades, will help to bring back into the proper path those of our officers who, fortunately few in number, are not inclined to make profitable use of their time, who strut instead of labor, and live in the memory of their exploits instead of advancing. The Soviet officer who does not lend his ear to critical observations intended for the purpose of improving his work and who refuses to analyze his actions is lost to the Red Army.

"The true officer of the Red Army is a worker, and that is the type of chief that has been created in our armies dur-

ing the course of the years. To remain equal to his task, the officer must work patiently, even in the post-war period. Without fatuity or pedantry, he will enrich his mind with new knowledge and will attempt to maintain at its maximum the fighting ability of the formation that is in his charge."

We shall not take the time to eulogize discipline. *Krasnaia Zvezda* writes at considerable length on the role which it played in the October revolution and the recent Soviet victories. It concludes: ". . . Tightening of discipline is an eternal military obligation."

As applied to officers, this prescription is still more rigorous: "He who has the right to command must know how to obey." Nevertheless, certain officers who, during the course of the war revealed themselves as perfectly disciplined chiefs, have relaxed and loosened the reins in time of peace. But the officer does not live in ethereal spheres and his moral weaknesses toward himself have an immediate and demoralizing influence on his men.

"In the matter of military science, a victorious army must not remain, in time of peace, in the positions gained by it in time of war. On the contrary, it must make every effort to pass these and to continue its progress.

"That is why submission to severe discipline on the part of all the chiefs of the Red Army, from the greatest down to the smallest, becomes a strict and indisputable obligation."

We do not believe that it would be without profit to deliver these long extracts over to the meditation of the members of our armed forces. The Swiss army, relieved from its six-year period of guard duty, has also acquired experince which it should turn to profit. It should not neglect to be always present and necessary in the life of the nation. The experiences of others agree with our own. We must emphasize this in order to correct the errors of judgment of those who imagine that we are practicing an obsolete form of militarism.

The army, harnessed to its peace-time tasks, is itself a powerful factor for peace, on condition that it maintain the purity of certain principles that have been defended by us at all times, principles which *Krasnaia Zvezda* does not hesitate to consider lasting.

Those who are trained live; those who are not trained perish. Your training mission is to prepare men to advance and fire promptly and efficiently in battle.

Revista Militar (Bolivia)

Antitank Artillery

Digested by the MILITARY REVIEW from an article by Lieutenant Colonel J. P. Johnson in "The Journal of the Royal Artillery" (Great Britain) October 1946.

IN order to assess the possibilities of stopping or breaking up a determined attack by armored fighting vehicles, it is necessary to have some idea of the developments in antitank defense and the changes in the balance of power between tanks and the guns opposing them.

Although the German Army used tanks with success in the over-running of Poland, it was not until the decisive battle of France in 1940 that technicians began to concentrate seriously on the possibilities of improving the hitting and armor-piercing capabilities of the antitank gun.

After the battle of France and until the invasion of Russia, the main developments in antitank tactics emanated from the British and German forces fighting in the Western Desert, where the British 2-pounder, although heroically employed on many occasions and destroying many German tanks, was not comparable in hitting power with the 88-mm and 75-mm German guns.

One main point, however, did appear as a result of the desert fighting. It was realized that antitank guns could destroy tanks with success only if they were defiladed from enemy observation and given every chance to hit the hostile tank in the side and not the more heavily armored front plates. During this period casualties in antitank batteries were very heavy owing to the ability of the German tank to halt out of range of the antitank guns and knock them out one by one with its 88-mm or 75-mm gun. Ingenuity in camouflage reached a high standard. The German tactics were to try to force the British guns to reveal themselves by opening fire prematurely.

The next big armored attack took place against Moscow in November of 1941, when a very large number of German tanks attacked under command of General Guderian and failed. The failure in this case was due to the multitude and variation of antitank obstacles, very heavy concentrations of field, medium and heavy guns, and bad weather. The antitank gun was not conspicuous and the Russians were not able to stop the various German thrusts of the following year 1942, which culminated in the battle of Stalingrad and the penetration to the Caucasus.

There were, however, signs of encouragement for antitank gunners. The 6-pounder had come into production on a large scale and General Rommel had attacked the British at Alamein and come away with heavy losses. Immediately, the 17-pounder began to make its appearance. Two interesting incidents occurred. The British 9th Armored Brigade ran on Rommel's antitank screen during the battle of Alamein and sustained heavy losses. An American armored force in Tunis attacked through the German antitank net and lost more than 250 tanks. It was becoming apparent that antitank guns properly deployed and in sufficient numbers could efficiently break up an armored attack.

The next development was the realization by both sides that the only tactical way to exploit armor to success was the neutralization of antitank guns by bombing, artillery fire, smoke and eventually by over-running the guns with infantry.

The illustration followed soon after. On 11 May 1944, the Eighth Army attacked over the Liri river near Cassino on a two-divisional front with a thousand-gun barrage. After some days of heavy fighting and the capture of the dominating high ground by the Polish Corps, it was possible to push the armor through the infantry's hard won bridgeheads, but

even then the German antitank guns sited on both sides of the valley took a heavy toll of tanks.

The rest of the story from D-day on followed the same pattern. Infantry always had to be used with tanks and often before tanks to neutralize or destroy antitank defense. Armor exploited alone in the face of an antitank defense always failed as at Rimini in the assault on the Gothic Line. Antitank mines and other weapons improved. The Germans had success with their bazookas. The Paratroops of the 1st Para Division were adapt at hiding among crops or in ditches and "picking off" tanks at fifty or sixty yard ranges. The Canadians knocked out three Tiger tanks with Piats on the Savio River crossing. There were many other instances, and it was common in Italy to see groups of damaged and burnt-out tanks of both sides lying about on the battlefields.

During the final spring attacks, breakthrough, and eventual pursuits, further troubles came to drive the German tanks from the battlefields. The rocket-firing Typhoon was used in both Germany and Italy with success. The damage done even to the heaviest tanks by rockets fired in this war was quite extraordinary. German crews used to jump and hide in ditches and trenches at the approach of our fighters. Cannon-firing Spitfires were

M-10 Tank Destroyer, with 3-inch gun. (Signal Corps photo.)

also used and although the damage done to individual tanks was not so great the results were quite satisfactory.

Another method was to spot tanks hiding in houses or sheds—a common German trick to give added protection to the armor—and then to engage with 17-pounders by indirect fire. The ranging was normally done with high explosives which gives a good burst and the destruction of the tank was then carried out with armor piercing ammunition.

Tanks have other weaknesses. They are vulnerable to concentrations of artillery which contain 150-mm HE shell, or heavier. Their range is limited by their fuel consumption, and their crews invariably suffer from intense fatigue if kept in action or in movement for any length of time.

The "dug-in" antitank gun has certain advantages over the tank as we have seen, and provided officers and men are well trained along the right lines, antitank regiments will always be the scourge of the enemy tank.

In February 1945, my regiment changed to self-propelled guns. In March, a further step was taken towards becoming tanks when the regiment became the divisional "armor" by taking over thirteen Shermans near Monte Grandi. This step, with our M-10s and Valentine 17-pounders training in battle at the same time, roused the greatest enthusiasm among all ranks, which reached its culmination when the division switched to the main Eighth Army front, and chased the enemy to the Po, at times, in defiance of the orthodox, with M-10s leading!

In general the advantages of the antitank gun against the tank are: (1) It is easily concealed and therefore difficult to "spot," (2) The commander and layer are normally shooting over ground and at ranges which are known to them, (3) Unless spotted, the gun has the advantage of first shot, (4) The armor-piercing shell has great penetrative and destructive effect, (5) A high rate of fire is easily achieved.

The disadvantages are: (1) Extreme vulnerability on the move, (2) Great vulnerability if not dug-in and camouflaged, i.e., "if caught in the open," (3) Flat trajectory limits the zone and sometimes the range, (4) Moderate cross-country performance. 57-mm can be manhandled almost anwhere, 76-mm is heavy and difficult to manhandle, (5) The shield is not sufficient protection to the crew, and (6) By themselves guns are easily overrun by infantry.

Notes on Employment of Artillery in Mountainous Terrain

Translated and digested by the MILITARY REVIEW from a Russian article by Major General P. Kasperovich in "Krasnaia Zvezda" (U.S.S.R.) 18 September 1946.

EVEN under the most difficult conditions of mountain warfare, artillery can accompany and support the infantry following it on wheels or by pack.

Mountainous topography makes maneuver along the front difficult. Therefore, correct distribution of artillery among rifle units is of great importance inasmuch as all units operate, as a general rule, independently, and any regrouping of the artillery is difficult and takes considerable time. Each infantry regiment should have previously assigned to it as much artillery as it needs for accomplishing its missions. The amount of attached artillery is determined by the situation, missions, and the degree of isolation of the regiments. It is of extreme

importance to reinforce the infantry with mortars and direct-laying guns.

In view of shorter distances involved in attacks, and the frequent impossibility of laying fire upon the main line of resistance during the period when the infantry assembles on the line of departure, the number of attached guns should be increased and the sector under attack should be flanked as much as possible. In cases of this type, flanking fires should be brought upon the enemy facing the neighboring unit while the artillery of the latter, in its turn, should support the attack of the first unit by flanking fires. Frequently, only this method of cooperation among the artillery units can neutralize and destroy the enemy.

Artillery preparation, as a rule, is conducted for the purpose of clearing the way for the infantry and tanks toward the objective of the attack. In mountains, however, artillery preparation is not always resorted to. The decision depends upon the terrain before the defensive position of the enemy, the amount of artillery, the possibility of massing fires on a certain sector, the character of artificial obstacles and fortifications of the enemy, and the stubbornness of the troops. A sudden attack in the mountains is often more successful than one preceded by a protracted artillery preparation.

If artillery preparation is necessary, it is planned in the usual manner. In preparing for an attack on the main line of resistance and before the assault of the position, mortars, artillery, and heavy machine guns, as well as direct laying guns, neutralize, first of all, those hostile emplacements which flank the advance of the infantry and which are located on commanding heights.

At the moment when the attack is launched, most of the artillery fires are transferred to the separate emplacements located on the nearest commanding heights. Part of the mortars, heavy machine guns, and direct-laying guns displace forward to new positions without breaking away from the infantry formations. When the infantry occupies a ridge or a mountain gap in the depth of the enemy defensive position, guns of regimental and divisional artillery should be placed there immediately. The course of the battle in the depth of the hostile position will depend, in many respects, upon how quickly the artillerymen organize observation, and upon the effectiveness of their action in the consolidation of the occupied terrain.

Limited visibility in close terrain makes orientation difficult and complicates the correct appreciation of the results of observation. The study of the terrain by comparing it with the map from one point does not obtain desired results. Therefore, all terrain features and reference points should be studied from several points.

The presence of unobserved areas calls for the extension of the net of observation posts, the establishment of lateral and forward posts, as well as for the employment of roving observers and post for simultaneous observation, located along the front, through the depth, and at different levels.

Mountains and wind affect the recording of sound. Aviation, therefore, becomes the basic means for locating hostile batteries and for the correction of fire. Generally speaking aerial reconnaissance is widely used in the mountains, but aerial photography is more complicated because of close terrain, low clouds, and shadows, which is especially true of valleys and gorges in the morning and late afternoon.

Short ranges, numerous unobserved areas, as well as the necessity for overcoming various terrain features, complicate the selection of firing positions. Here the guns cannot be placed at the usual

distances from each other and at the same level. A seemingly good position may become unsatisfactory because of the difficulties involved in its quick occupation and further displacements. Not infrequently, all guns of the battery are placed at different levels behind each other.

To decide whether to centralize or decentralize the artillery depends upon the situation, but experience shows that under any circumstances artillery centralization is more desirable. The original grouping has the decisive influence upon the course of action inasmuch as shifting artillery batteries along the front is often altogether impossible.

The offensive engagements carried out by the troops of the Fourth Ukranian Army Group, which were characterized by stubborn enemy resistance on intermediate positions and the necessity for massing fires upon the strongpoints located on these terrain lines, called primarily for centralized control and direct handling of the artillery by senior artillery commanders. When the enemy was about to withdraw and our units began pursuing, the artillery was usually decentralized. In the course of the battle, when the general attack of the division split into a series of separate engagements for separate heights, calling for the employment of maneuver, artillery battalions were then assigned to infantry battalions and batteries to infantry companies. Whenever it was necessary to place a hostile intermediate position under artillery concentrations, control was again centralized. Such changes from one form of control to the other call for considerable flexibility in the work of the staffs and for the organization of an excellent communication system.

The corps group was usually formed of one howitzer regiment, a group of rocket launchers, and the antitank reserve. Army artillery groups were not formed at all. The commander of army artillery had at his disposal only the antitank reserve.

In determining the time of the beginning of decentralization, one should consider road conditions in order to prevent the artillery attached to various infantry units from lagging behind. In all cases, part of the heavy and long-range artillery should remain under the direct control of the senior artillery commander, to be used for flank security and for firing concentrations.

Offensive battles, especially breakthrough operations, call for a great expenditure of ammunition. In view of the difficulties involved in the transportation of ammunition, the tonnage of which comprises the bulk of all troop supply, all combat missions should be accomplished with severe economy in ammunition.

Infantry units, artillery firing positions, mortars, heavy machine guns are pin-point targets and are attacked, as a rule, by diving planes. A large number of objectives in narrow winding gorges, unable to disperse quickly, calls for the employment of attack aviation. In repelling these, the antiaircraft artillery is at a disadvantage. The instruments, built for firing upon horizontally moving targets are seldom used.

These considerations, as well as the difficulties involved in moving the antiaircraft artillery when roads are not available, and the limited number of good firing positions, narrow down the possibilities for the employment of the antiaircraft artillery of medium calibers. Most of these disadvantages do not exist for the small-caliber artillery, and it therefore, carries the main burden of antiaircraft security of troops in mountain warfare.

Infantry weapons acquire considerable importance for firing at aerial targets, and their effectiveness is augmented because of the fact that the antiaircraft generally fly low.

A Record of the First Polish Armored Division

Digested by the MILITARY REVIEW from an article by Cyril Falls in "The Illustrated London News" (Great Britain) 26 October 1946.

IF justification were needed for the inclusion of a Polish formation in the series of war records of troops of the British Commonwealth of Nations it would not be difficult to find. In the first place, the 1st Polish Armored Division from its inception was under British command. Then the high quality of the Polish troops makes it suitable that one of their divisions should take its place in the series. The origin of the division is found in 1939 when, at the time of the German invasion of Poland, one of the two Polish motorized formations was the 10th Motorized Cavalry Brigade. This brigade distinguished itself in the gallant but hopeless struggle in Southern Poland and earned the respect of the enemy, who gave its troops the nickname of "the Black Devils," because they wore black leather jackets. After the Russian intervention the brigade crossed the frontier into Hungary, where it was disarmed and put into concentration camps.

How the brigade, or a large proportion of it, made its way out is a story which has not yet been told in full. It reappeared in France, and in 1940 fought in another disastrous campaign. Then the brigade was reconstituted in Scotland and became the 1st Polish Armored Division. Its training was a matter of difficulty, since all ranks who attended British courses of instruction had to learn English. Though the division's "home" was always Scotland, it carried out a large proportion of its training in England. In June 1943 it moved to the Newmarket area for training in the latest methods of armored warfare and took part in several large-scale exercises. In September it returned to Scotland for final reorganization and re-equipment. In May 1944, now ready for action, it came south to Yorkshire. It now consisted of the 10th Armored Cavalry Brigade; the 3d Infantry Brigade; an artillery brigade of two field, one light antiaircraft, and one antitank regiments; and the 10th Mounted Rifles, the reconnaissance regiment. In July it moved from Aldershot to London for embarkation, and on the 31st of that month the first troops landed in Normandy. The Poles had thus been waiting four years for the return to the continent, though their brothers were fighting in Italy, where they had made a great name for themselves.

A week after landing, the 1st Polish Armored Division went into action as part of the Second Canadian Corps in the offensive south of Caen. Simultaneously, the Germans launched their counteroffensive in the region of Mortain, and the division was destined to play a leading part in closing the pocket which was created when the Allies, from north and south, cut in behind the German forces. Early losses were heavy, but the spirit of the troops was undaunted. For the first time they were meeting the enemy on equal terms as regards equipment and with air superiority, and they were determined to succeed. The final sealing of the diminishing gap in rear of the trapped German forces involved the capture of Chambois and of a height, Hill 262, dominating the last roads by which the enemy could escape. On 19 August Chambois was taken after fierce fighting. The 1st and 2d Armored Regiments and the 3d Infantry Brigade seized Hill 262. A moment never to be forgotten came when the Americans appeared from the south. The Falaise pocket was closed. Yet all was by no means over. The Germans launched attack after attack, led by the 1st and 12th SS Divisions, in an attempt

to break through. In their position on the hill, the Poles were practically isolated. Their situation became critical, especially on the second day, when food and ammunition could no longer be brought up and wounded could not be evacuated. On occasion, tank fought tank at fifty yards' range, and hand-to-hand struggles were frequent.

On the third day, however, the pressure began to slacken. The enemy was beaten, and prisoners began to pour in by the thousand. On 21 August the 4th Canadian Armored Division came through the Poles to complete the mopping up. It found the roads so choked with destroyed material and transport that bulldozers had to be used to clear a way. Only now did the Poles realize how exhausted they were after their great feat of arms in withstanding the frantic efforts of some of the best German divisions to break out. The division was given six days to rest and replace damaged equipment. On 28 August it set off to take part in the pursuit. Crossing the Seine, it dashed northward by way of Abbeville, St. Omer, Ypres, and Roulers, and on 10 September relieved the 7th Armored Division in Ghent. It then received orders to clear the enemy from the area north of Ghent and west of the Scheldt. This operation, in country far from suitable to armor, lasted until 22 September and entailed some hard fighting before Terneuzen, on the south side of the West Scheldt estuary, was reached.

The division next moved eastward to join the British I Corps and take part in the operations for the clearance of the approaches to Antwerp on the inner flank. This involved, in the first place, a drive in the direction of Tilburg against an enemy who was once again resisting strongly. Baarle Nassau and Alphen were taken, and the division got within fifteen miles of Tilburg, but the wedge which it had driven into the enemy's front placed it well in advance of neighboring formations. A three weeks' halt followed, after which the offensive was resumed on a larger scale on 27 October. The objective of the Poles was now Breda, which fell on the 30th. Next day they moved northwards towards Moerdijk. The chief obstacle, and a formidable one, was the Mark Canal. After four days of heavy fighting a bridgehead was established over the canal and held in face of counterattacks. Through it passed the armor. The heavily fortified and stoutly defended Moerdijk bridgehead was captured, concrete pillboxes being destroyed by the tanks at point-blank range. By 9 November the whole southern bank of the Maas had been cleared. Thereafter, this section of the front relapsed into stagnation, during which the most important active operation was the reduction of the Kapelsche Veer, the last German island stronghold, after a fierce fight. In all this fighting, tanks had been confined almost entirely to the roads, easily defended by a determined enemy. In these circumstances, artillery and air support had been of the utmost value, and the division had been well served in respect to both. Its engineers had done fine work in country seamed with a network of canals.

The role allotted to the Poles throughout the winter was a curious one for an armored division. It was that of holding the Maas on a frontage of some thirty miles. The task was uninspiring, and at the same time probably more fatiguing than that of open warfare. The Germans showed themselves highly enterprising in patrolling and made the best possible use of the long winter nights. They had plenty of craft at their disposal, and when they made up their minds to cross, it was rarely possible to prevent them from getting over at some point, often at a number of points simultaneously. All that could be hoped for was to prevent them from

penetrating too deeply and to make sure that when a party was discovered it was driven back across the river as soon as possible. Often enough the posts watching the cold and dismal river were up to their knees in mud and water. The division hoped it would be called into action when the Germans launched their offensive in the Ardennes, but it had to remain at its post, and when the Allied offensive was resumed the expected summons still did not come for some time. Artillery bombardments and raids across the river provided the only possible forms of offensive action. Altogether it was a type of warfare most unwelcome to the ardent Polish temperament.

It can readily be imagined, therefore, with what excitement and enthusiasm the order to move was received when it came on 7 April 1945. The 1st Polish Armored Division set out on the 9th, and for the first time crossed the German frontier, moving through Goch to the Rhine at Rees and there crossing the river. Although it had crossed into Germany it passed back into Holland for its first operations, advancing in a general northwesterly direction. The leading troops captured Coeverden and Emmen and again reached the German frontier at Ter Apel.

The division continued to press northward, clearing the waterlogged and canal-seamed country and capturing a number of small towns with assistance from the Belgian Special Air Service and French parachute troops.

On 19 April the 10th Armored Cavalry Brigade reached the line of the Kusten Canal. Flame-throwing "Crocodiles" were brought up and powerful air and artillery support was provided for an operation to secure a bridgehead, which was done after hard fighting. During the next few days the towns of Aschendorff and Papenburg were captured, but in the area of the Ems and Leda, the division was now virtually immobilized by innundations, a network of rivers and canals, with all the bridges destroyed and demolitions on the roads. All that could be done was to mop up the area occupied, with the aid of the RAF, and even this was slow work. A bridgehead over the Leda was secured south of Apen, but the road behind it was impassible, so that the maintenance of the troops beyond the river constituted a great strain. On 30 April the armored brigade crossed the river at Leer, while the infantry crossed in force near Apen and moved in the direction of Westerstede. The country north of Leda was more suitable for armor, though broken bridges and obstacles covered by antitank artillery prevented the advance from being rapid. The last shots were fired on 5 May, on which date the head of the division was about fifteen miles south of Wilhelmshaven. Next day the 1st Polish Armored Division entered this famous German naval base, over which the Polish flag was hoisted.

In the course of its short fighting career in Northwest Europe the division had suffered over 5,000 casualties. It had captured about 17,000 prisoners. Many foreign troops have in the past fought in the British ranks. Many have distinguished themselves and are favorably remembered. None will take a more honorable place in our military history than the exiled Polish forces of World War II.

Guerrilla Action Leads to Victory

Translated and digested by the MILITARY REVIEW from a Portuguese article by Major Jaime R. Da Graca in "A Defesa Nacional" (Brazil) September 1946.

GUERRILLA action assumes, many times in modern warfare, a role that is more important than that of the regular operations. But, as yet, apparently, the study of this form of action is not receiving the attention it merits.

Operations conducted in the mountainous terrain of the Balkans and the forests of the Pacific areas, showed the possibility of regular forces being beaten, little by little, until finally defeated.

Though they may not be able to destroy the enemy, the task of the guerrilla fighter is to trouble the enemy's movements, to render existence impossible in the occupied territory, to instill terror and loss of confidence, and to reduce his morale to such an extent that it becomes impossible to carry on operations.

The principle to be employed in guerrilla warfare is that of economy of forces to a high degree. To this end, there are organized innumerable detachments operating in accordance with a plan of guerrilla action worked out in time of peace.

The guerrilla detachments, operating on the basis of mobility rather than of strength, move here and there over the terrain like chess men, and their well oriented combination leads to decisive results.

Good intelligence service is one of the factors that makes for success in guerrilla action. Agents making use of the radio rendered inestimable service in World War II.

Terrain exerts a great deal of influence on the conduct of operations. Mountains, deserts, or wooded country determine the type of operation that is to be conducted.

Among methods of operation are direct attacks, attacks on communications, the cutting of signal communication lines and the disruption of supply service.

Direct attack is often limited in time to too great an extent; at other times, however, it is decisive when directed against a certain portion of the enemy's forces.

Attacks on communication lines, the cutting of signal communication lines, and the disruption of the supply service are productive of important results when advantage is taken of the effects of surprise.

Night operations occupy a place of great importance in guerrilla action. Likewise bad weather, which ordinarily interferes with the movements of regular forces, favors the action of small and fearless groups.

Every sort of obstacle should be made use of for rendering the movements of the enemy difficult. Mines in favorable places, taking advantage of natural obstacles, destruction of bridges, etc., delay regular forces temporarily, at least.

Drawing the enemy, by means of small forces, into ground where he would be forced to fight at a disadvantage is one of the most important methods to be studied in guerrilla action.

The weapons employed by guerrilla forces are special ones. For groups of concealed men in cities or important localities, individual weapons are in order. Larger detachments may use the thirty and fifty caliber machine guns. In some large operations, it is necessary to have the cooperation of mobile artillery and aviation.

Camouflage in all the forms occupies an important place when success depends on surprise.

As a rule, guerrilla fighters subsist on the local resources of the country,

a thing which is facilitated when the civil population is well trained, each person acting in the capacity of an actual guerrilla fighter.

Ammunition must be used sparingly and all the matériel captured from the enemy accorded maximum utilization.

Lastly, it is in command that we find the real factor of success. A well trained and determined chief of great moral strength who is ready to sacrifice himself and confident of final victory, is able to lead his guerrilla unit to decisive results against an army of regular forces.

Radio-Guided Projectiles

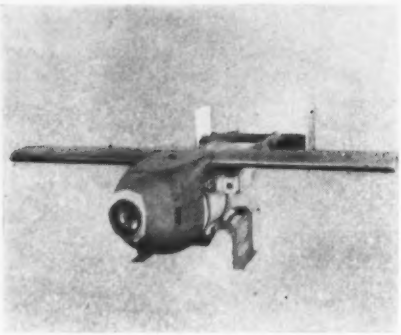
Translated and digested by the MILITARY REVIEW from a French article by Jerome Cardan in "France d'Abord" (France) 13 November 1946.

CONTRARY to what has commonly been believed, neither the V-1 nor the V-2 was guided by radio. The V-1 simply made known its course by means of signals periodically emitted, while the complicated control apparatus of the V-2 was abandoned because it was too delicate. This check in radio-guided projectiles during World War II was due to the great development of radio counter-measures (RCM). They had been developed by the English as far back as November 1940. English scientists assisted, moreover, by French scientists who had taken refuge in London or who continued to work in France, began by plotting the beams on which the German bombers traveled. They then learned to transmit them and to shift them gradually so as to throw the bombers off their course. As a matter of fact, all that was required was an error of one or two degrees to produce inaccuracies of fifteen to twenty kilometers at distances equivalent to that from Calais to Birmingham. The greatest success in this first stage of RCM is the case in which 200 German bombers dropped 400 bombs killing only two chickens in a farm yard.

In 1941, the Germans practically abandoned the radio-beam system for guiding their planes and they began to develop RCM methods. In February 1942, the Germans thus won a great tactical victory while the battleships, *Scharnhorst* and *Gneisenau* steamed from Brest to Danzig.

The English scientists replied to this by perfecting the device called the "airborne cigar" which permitted jamming any sort of waves by means of a piece of apparatus so light that it could be carried by a fighter plane. The action of the "airborne cigar" put an end to any attempts at the employment of radio-guided projectiles till the beginning of 1943.

In 1943, the Germans began development of a system of remote radio control which made use of a number of wave lengths and permitted them to control the glide bombs of the Heinkel type. The first success scored by this type of projectile was in the tragi-comic battle between the *Luftwaffe* and the Italian fleet after the surrender of Italy. The Italian fleet attempting to reach Malta was attacked by the Germans with glide bombs. If the reports found in the German archives are correct, the Germans succeeded in sinking the battleship *Roma*, two heavy cruisers, and in damaging a large number of other war vessels.



Radio controlled glide bomb used against Cologne. (U.S. AAF photo.)

Allied scientists set to work again and found a means for neutralizing the control devices of the flying bombs. The reply of the German scientists never saw the light of day. The devices they perfected were to have been constructed by a series of production methods, in July, 1945. These devices comprised, on the one hand, an ultra-short wave control for the Schmetterling rocket projectile and, on the other hand, an extremely ingenious, radio-guided rocket projectile which would climb along a beam of radar waves till it met the enemy plane. This result had been achieved by means of a sort of radio-electric compass which exercised a direct control over the steering apparatus of the projectile, guiding it, thus, into the beam.

It is generally considered that these rocket projectiles, a single one of which was capable of bringing down an enemy plane, would have dangerously compromised the military supremacy of the Allies if the factories which produced them had not fallen into the hands of the Russians at the time of the amazing advances of the Soviet Army in the spring of 1945.

The Americans announce, now, that they have perfected a system for guiding projectiles by radio which is accurate up to distances of thousands of kilometers and which cannot be jammed. This method is, in short, a military utilization of loran. Loran (Long Range Navigation) is, like radar, a discovery that was born of the recent war, but it must not be confused with radar. Loran makes use of long and medium length radio waves, that is to say, the waves on which musical programs or news reports are broadcast. On these waves, loran superimposes extremely short electrical impulses (one one-millionth of a second), emitted by several stations. These impulses permit a flying object to determine its position accurately at a distance of 1,000 kilometers.

Loran waves may, moreover, be camouflaged as musical programs or as propaganda broadcasts.

In place of the luminous map watched by a pilot when using loran, it is possible to employ an electrical control device directing a flying bomb. Flying bombs controlled by loran thus permit strategic bombing attacks at great distances. The enormous military importance of this system rests in the fact that there is no connection between the station from which the flying bombs are

Guided aerial torpedo used against the Japs. (U.S. AAF photo.)

released and the guiding station. Thus, the flying bombs can be launched from stations located near the fighting front while the guiding is effected from stations located a long ways to the rear of the front. Moreover, one single guiding station can guide any number of flying bombs—there is no such thing as saturation. Contrary to the case of V-1 and V-2, the personnel of the launching platforms have only very simple operations to carry out and, once the bomb is launched, have nothing else to trouble themselves about. Several totally independent launching stations, which need have no knowledge concerning one another, may concentrate their projectiles on the same target. The rocket projectiles, once launched in the general direction of the target, may cover as much as half their course under the control of a gyroscopic compass which maintains their course in the general direction of the target. As soon as a projectile has reached the loran zone, it changes direction and begins to follow the lines of the loran. The general effect is that of a rain storm in which the drops of water, concentrated by a funnel are directed by a pipe onto a target.

Of course, one may slowly move the coordinates of the target so as to "spray," systematically, a given surface. With a sufficient number of flying bombs one obtains, thus, a coverage which can destroy, with certainty, a target situated in a given general direction.

The personnel of the launching platforms have absolutely nothing to do with the localization of this rain of bombs. Their role is limited to placing and firing of them as rapidly as possible.

The strong and the weak points of this system reside in the fact that no signal needs to be emitted by the flying bomb. This is why this method can be used for strategic bombing at great distances. It replaces the bombing squadrons of World War II. It has the advantages that it can be used in any weather, independently of atmospheric conditions—except, obviously, at times when magnetic storms are in progress, which could entirely prevent the reception of the signals, but such storms are extremely rare.

The best solution appears to be a lamp (possibly infra-red) attached to the bomb, which permits the following of its movements. The bomb can then be controlled by ultra-waves, which cannot be jammed. In this case, the receiving set in the bomb must be capable of operating on a large number of wave lengths (from twenty to fifty) and an automatic device must change the receiver from one wave length to another. As is known, it is possible to make use of a large number of different wave lengths in the ultra-short band.

As is also known, a new system of radio transmission called impulse-modulation makes it possible to broadcast 100 programs at the same time, with the same transmitter, without impairment of the quality of the reception. It is certain that this method, which is at this moment being intensively studied in France, will be applied to the radio control of projectiles.

Wars are fought and won by men, not by weapons; in the last analysis it is the knowledge and courage of the men who fight and the officers who lead them that wins victories. Take care of your men first, last and always.

Revista Militar (Bolivia)

The Value of Predicted Harassing Fire

Digested by the MILITARY REVIEW from an article by Lieutenant Colonel T. P. Keene, in "The Journal of the Royal Artillery" (Great Britain) October 1946.

FOR a very long time it has been a most debatable subject, some considering it as probably inaccurate, certainly a waste of ammunition, and a sure method of giving one's position away: others believing it to be a very considerable factor in reducing the morale of the enemy. The opponents of it can always point out the amount of ammunition used and the retribution that sometimes arrives upon the firer. The supporter of harassing fire, on the other hand, is rarely in a position to prove that his efforts have been effective; the degree of retaliation and the enemy's change of habits (if they can be discovered) can normally be the only indication of efficiency or lack of it. Also the opportunity of testing the accuracy, or lack of it, of such fire rarely occurs and the doubter is always prepared to believe that it is anyway insufficient to be of use.

Undoubtedly harassing fire, unless it is based on good reliable information from every possible source, tends to be more of a menace to the firer than to the supposed recipient of such fire, and it is probably the fact that a great deal of harassing fire has at times been sent over blind that has led to the condemnation as valueless by so many.

Having recently had a golden opportunity to check on the efficiency of part of the harassing fire fired by the regiment of which I was second-in-command, I feel the result of the investigation may be worth recording.

Early in December 1944, the regiment took over the gun positions from another regiment west of the Maas between Venlo and Roermond and were told that at least one battalion area had been fairly heavily shelled and would undoubtedly be shelled frequently. In view of this and the fact that conditions were static, leading us to expect a considerable stay in the area, possibly of two or more months, a new gun area for the regiment was reconnoitered and occupied as soon as prepared, one battalion at a time remaining in the unshelled part of the old area as "Active Battalion," those in the main position remaining silent.

Ammunition was not plentiful, but enough was available to maintain the enemy's healthy respect for our artillery fire provided the best way could be found to apply it. The main trouble was that not only were good observation posts non-existent, but an almost constant mist over the River Maas, which separated us from the enemy, and the large number of trees made observation on all but a few small areas nearly impossible. Many areas were invisible even from an air observation post. After allowing for such firing as might be possible by observation from the air and ground and also from counterbattery fire ordered by the counterbattery officer, it was obvious that a fair amount of our permitted ammunition expenditure would remain, and I decided to work out a regular and systematic program for keeping the enemy guessing.

I set out from the beginning with the object of making the Boche feel that nowhere in the area was he safe from disturbance by day or night and that any activity of his, be it military, recreational or purely personal, was liable to be shelled, and that such shelling might be repeated any time in the next ten minutes or ten hours, or not at all.

The sources of information on which plans could be based were (1) Dutch line crossers who swam the Maas to our

side, (2) air photos, (3) direct observation from air or ground, (4) the occasional prisoners, and (5) listening posts on the river bank.

From these sources a list of suitable targets was built up. They consisted roughly of the following:

(1) About fifteen farms or buildings known to be occupied and scattered all across the front.

(2) The only two crossings over the antitank ditch which ran parallel to, and a few hundred yards beyond, the river. All reliefs or supplies coming to the forward posts had to cross one or the other of these.

(3) Five small villages of some fifteen to twenty houses lying ¼ mile or so back from the river.

(4) A large house persistently reported as being an enemy headquarters.

(5) Two or three patches of scrub on some sand dunes obviously holding some form of dug-out or gun pits.

(6) Certain parts of a large village lying a mile back from the river which the Dutch persistently reported as being occupied by German troops relieved from forward posts.

All these were obviously not found out at once, and our original list of targets was small, but was gradually built up as time went on.

The first step was to arrange how the harassing was to be done, and to this end a totally new harassing fire position for one battalion was found, well dug in and subsequently occupied by each battalion in turn for four days at a time. All harassing fire was done from this position.

Next as coordinates of the targets had to be taken from a 1:25000 map, it was necessary to test its accuracy by shooting, and this allowed the calibration of the guns to be tested at the same time. To do this, I chose three targets and ordered the guns laid by coordinates, and then observed each battalion in turn fire on them, adjusting the fire from an air OP. The results of this were more successful than I had hoped, something like twenty-five per cent of the rounds being direct hits on the farm buildings, causing considerable damage.

Finally the method and times of engagement of the various types of target had to be thought out and I came to the following decisions:

(1) That the headquarters house was fair game at any time, but that night shelling would serve the purpose best, keeping people awake.

(2) That occupied houses and villages in the forward company areas could best be initiated at meal times or times of reliefs.

(3) That road defile targets should be fired on at times when traffic was known or expected to be there. The regular habits of the enemy helped us here as our forward posts constantly reported light traffic in the area at certain times, night after night.

In this way it became possible to build up a full harassing program for each twenty-four hours, some 4.2-inch mortars joining in the daytime shoots. The usual twenty-four hour program would consist of something like this:

0730-0750. Each battalion engaged three targets with one round per gun. These targets were usually occupied farms or billets and the enemy ate about 0730 hours. The time was varied from day to day to coincide with other meal or relief times. The mortars fired at exactly the same time on the same or other targets. The fire of the two troops was always synchronized, even though they were firing on different targets.

1515 hours. Each battalion one round per gun on tow targets, one probably the same as a morning one.

2030 hours. (i.e. current time for enemy's vehicles to come up). One round

per gun from the battalion on one of the antitank ditch crossings.

2355 hours. One round per gun from one battalion on the headquarters.

0320 hours. One round per gun from one battalion on the headquarters.

On the following day, times and targets would be changed and the reserve company areas in the villages further back would be subjected to night disturbance. As an alternative for the night firing, particularly on the headquarters, one gun might fire, say ten single rounds at varying intervals between 2300 and 0600 hours.

Results of all this at the time were hard to get, but the following cheerful signs were seen:

(1) Ambulances driving up after daytime firing or at dawn—this happened two or three times.

(2) Wild and pointless bursts of automatic fire from areas shelled.

(3) Horse-drawn transport apparently bolting after night firing on transport. This caused huge delight in the infantry listening post that heard it.

(4) Ten minutes retaliation fire on an open field 300 yards from our harassing fire position. (Casualties to us, one limber wheel smashed!) This was the first and last time that the enemy showed signs of having located the position, though there was a certain amount of rather wild shelling vaguely in the area.

Thus we had to leave it when in the latter half of January 1945 we pulled out to rest and refit before the attack on the Siegfried Line and Cleve—and as with most harassing fire, we hoped it had effect, but could not be certain.

When early in 1946 I found myself stationed only some fifteen miles from the area that had been subjected to this harassing, I set out to find out what I could about the effects of the fire.

The first place I visited was a patch of scrub in which suspicious digging had been seen and which had been subjected to our harassing fire on very few occasions only, as we had no certain information about it; the information being taken from air photos. On inspection it was found that there were four gun or mortar pits with shallow personnel shelters among them. All were beautifully hidden except one, which had attracted our attention, and was still very obvious. Several shell and mortar craters were found amongst the pits (we had used 4.2-inch mortars on this target) which testified at least to the accuracy of the fire. Whether it was actually occupied at the times it was shelled was not certain, but it was obvious that it had been occupied and was not merely a dummy. The next visit was to the large house we had believed to be headquarters and here we were lucky enough to find the owner's wife who had been in the house at the time. Far from execrating us as the wreckers of her house and disturbers of her peace, she was delighted to give us details of what it had been like to be at the receiving end! At the relevant time, a major, a lieutenant, and about 120 men had been in the house and some guns had been in the orchard some 200 yards away.

The house itself proved to be a large one, built on the lines of a castle with very thick walls and surrounded by a moat. About twenty-five shells had actually hit the house of which about twelve had hit the roof, some bursting in the house itself. One round after coming into the house had passed through the top two floors and two walls, flattened a water pipe, gone through a door and ended up rolling about unexploded on the main first-floor landing! This apparently was by no means the only dud and is the first case I have ever met of the percentage of duds from twenty-five pounders being anything but extremely small. The stables and outhouses at the back of the

house had been badly shattered and many shells had fallen in the immediate surroundings and approaches to the house. At one time there were no less than twenty-four shell holes in the ice of the twenty-yard wide moat immediately surrounding the house.

During the period that this headquarters was a harassing target, therefore, of the estimated 250 rounds fired at it over a period of about five weeks, at least fifty were either direct hits or within twenty-five yards of the house and many more hit out-buildings. In spite of the fact that it is a large house these figures, I think, show the fire was very accurate.

A later tour round a number of farms and hamlets that had figured on my target list produced some extremely heartening evidence. Undoubtedly the Germans were thoroughly rattled by our shelling, and as one Dutchman put it "every German thought our guns were after him personally." Apparently the arrival of only four shells close to an occupied farm made the German think he had been discovered and were it possible, he moved on elsewhere at once. One example was a headquarters which made three moves in three days as its itinerary happened to coincide with our choice of targets. A similar story is related of a Signal Exchange which, when its farm was hit, moved into the family's air-raid shelter about seventy-five yards away to a flank. This, unfortunately for the Germans, was close to another target, and the arrival of a couple of what were probably 4.2-inch mortar shells beside it sent them precipitately back to the rear to the delight of the owner who disliked shells but loathed Germans.

Evidence of casualties was also obtained. The owner of the farm in which an aid post had been established states that he had seen some fifteen wounded coming in about that time, while another farmer had seen men killed by a direct hit while running for shelter.

There seems to be no doubt that in certain circumstances a carefully planned harassing fire program based on all sources of information and on logical deduction from map and air photos as to the enemy's whereabouts can be very effective in keeping him in a state of perpetual jumpiness. In this particular case, eight unseen guns firing about fifty rounds a day succeeded in keeping about a regiment of paratroops in a state of thoroughly low morale over a period of weeks.

Finally, though it is not the object of this article to discuss counterbattery and counter-mortar fire, the effectiveness of it was continually mentioned in the evidence I was able to collect. Almost everyone I spoke to emphasized that any light gun or mortar in the area had to move immediately after firing or suffer a twentyfold retribution.

The higher the post of a commander, the more must his valor march hand in hand with prudence.

A Defesa Nacional (Brazil)

The Battle of Lake Comacchio

Digested by the MILITARY REVIEW from an article by Major W. R. Sendall, in "The Navy" (Great Britain) November 1946.

AT the end of March 1945, the Eighth Army in Italy, after a bitter winter campaign, faced strong German defenses along the line of the Reno river. The Reno, after running from west to east, turns suddenly north in its lower course to debouch into the Adriatic, leaving a narrow tongue of land between its right bank and the sea. Immediately north of the river and divided from its east to west course by a narrow strip, lies the shallow and muddy Lake Comacchio. Between the lake and the Adriatic is a narrow spit of sand and marsh, intersected by two substantial canals and numerous dykes and ditches, and further complicated by extensive defensive flooding by the enemy. The Germans obviously regarded their left flank, resting on this maze of waterways, as safe from any turning movement, especially as they held "the Tongue" south of the river and had strengthened the natural difficulties of "the Spit."

Field Marshal Alexander decided to rely on the classic strategy of Blenheim and Ramillies, a powerful feint that would alarm the enemy into a dangerous redisposition of troops. The 2d Commando Brigade was selected to attack this amphibious flank and draw in German reserves. When the line had been stretched by the threat, the Eighth would strike in strength in the Argenta defile further west, in the expectation that the taut line would snap.

The Commando plan was for an amphibious attack across the lake against the inland side of the coastal "spit" by Nos. 2 and 9 (Army) Commandos, while the Marines of 43 (Royal Marines) Commando first cleared "the Tongue" at the mouth of the river, then thrust up the "spit" to the Valetta canal, which bounded it on the north. No. 40 (Royal Marines) Commando was to make a feint across the Reno to cover the crossing by the army men and then join in clearing the narrow area between the lake and the east-west channel of the river.

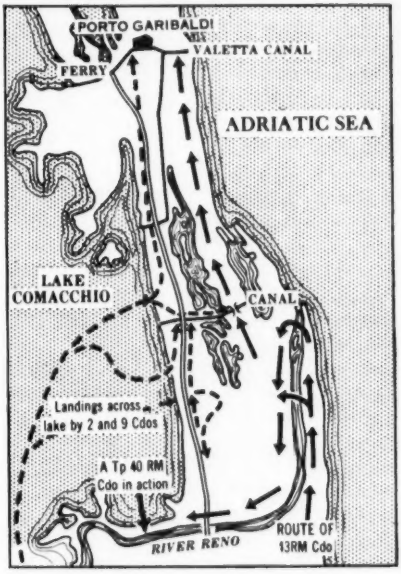
The start of the marine attack on "the Tongue" depended on the progress of the army men across the lake, but they pushed forward to exposed positions as close to the enemy as they could while they waited for the signal. The diversion of 40 Commando, who drew on themselves a heavy fire, was supplemented by a blare of loudspeakers transmitting the rattle of tank tracks and engines with thunderous passages of Wagner's music. Cloaked by this fantastic fanfaranade, the army commandos slipped over the river and formed up on the lakeside. Weeks of dry weather had lowered the level of the lake and made a mudtrap of the shallows, in which amphibians became inextricably bogged, but, undaunted, the commandos heaved and hauled shallow-draught assault boats through nearly a mile of glutinous, stinking mud and transferred their fighting troops into them. Despite this delay, which jeopardized the whole intricate, delicate machinery of the plan, they pushed on across the lake to their objectives.

In their exposed positions on "the Tongue," the marines waited anxiously till the first flush of dawn, when, rather than prejudice surprise, they were withdrawn slightly. When the news at last came that the soldiers were well on their way across the lake, the marines flung themselves against the enemy under a heavy concentration of artillery. The right-hand troop was pinned to the ground by intense machine-gun fire before the German positions. The reserve troop on

the right was moving up in armored troop carriers, but these vehicles sank into the soft sand so that the advance had to be continued on foot until this troop also was held up by the German machine guns. The troop on the left had better fortune and broke through, whereupon the right wing reorganized and returned to the charge, carrying the defenses in the teeth of heavy fire. They pushed on to the tip of "the Tongue," killing and mopping up the broken enemy, while behind them two fresh troops formed up to force a crossing of the Reno from east to west.

The first crossing was made at the river's mouth by a troop mounted in tracked amphibians, which immediately began to fight its way south along the left bank. Further upstream the crossing had to be made in portable assault boats which were put together under heavy fire. Once over, this troop held a bridgehead in flat, exposed ground while reinforcements were ferried across, the heavy fire killing half the small party operating the ferry. The next objective was a position among scrubby sand dunes containing two antitank guns and held by a company of infantry, whose automatic weapons commanded a perfect field of fire across the flat meadows of the riverside. The artillery put down a heavy concentration of high explosive and a prolonged smoke screen to blanket the position while the marines moved up. The attack broke on the Germans through the smoke a few moments after the storm of shells ceased, so that they offered poor resistance.

Meanwhile the army had landed farther up the spit and, despite heavy casualties, captured two bridges across the first of the canals linking the lake to the sea. One of these bridges was blown five minutes before the soldiers could reach it. They then turned south and, between them and the marines, the Germans in the southern half of the spit were eliminated.



Battle of the Spit.

The advance north to the Valetta canal which sealed the north end of the spit could not start till the next afternoon when the blown bridge was repaired to allow the passage of tanks. No. 43 (Royal Marines) Commando attacked up the seaward side with No. 2 (Army) Commando on their left against the lake. The marines progressed with little opposition till they encountered a minefield which forced them to change their route. This led them against a German position among some houses, but a blanket of smoke from the artillery blinded the defenders and a swift assault overwhelmed them.

The approach to the Valetta canal was flat and open. Whatever cover had existed had been carefully removed by the Germans to improve the field of fire for their machine guns. As the leading

troop reached this glacis, machine-gun fire swept the ground like a scythe and the whole troop was pinned down.

At this moment a corporal was seized with that magnificent and sustained impulse of supreme courage that gained him the Victoria Cross—the one V.C. gained by the corps during the war.

The corporal was in charge of the Bren group of the leading subsection. When this storm of fire burst on them, he observed that the most deadly emanated from a position in a group of houses just south of the canal, two hundred yards ahead. He knew that the men behind him were in the open at the mercy of the machine guns in that position, so he seized the Bren gun and charged forward alone. Three machine guns from the houses and at least six from the north bank of the canal turned on him as he plunged across the open, but through the storm of bullets he raced on, firing his Bren from the hip and changing magazines as he ran. The Germans watched that solitary figure with astonishment that gave place to fear. Bullets would not stop him. He broke in among the houses firing bursts from the Bren. The nerves of the defenders could not stand this inspired fury; six of them surrendered and the remainder fled in panic across a footbridge over the canal.

The corporal followed up fast, but the guns from the north bank took a heavy toll. He threw himself on a pile of rubble in full view of the enemy and opened an accurate, deadly fire on the concrete pillboxes housing the machine guns and their crews. Like his whole conduct, his shooting was inspired and he silenced first one and then another, at the same time drawing all the fire on himself as he lay in the open. At last the inevitable happened and a burst of bullets struck him in the head, killing him instantly, but not before he must have known that he had enabled his comrades to reach their last objective, the south bank of the canal.

By the capture of the spit, the allied front was advanced some seven-and-a-half miles and 944 prisoners taken, 450 of whom were bagged by 43 (Royal Marines) Commando. Many Germans were killed or wounded. But this was not the measure of their success. In alarm, the German commando moved five battalions to cover Comacchio and their left flank, and brought the 29th Panzer Division complete from north of the River Po to guard against a breakthrough. This drained off reserves and sharply diverted the enemy's attention from the vital spot where, six days later, the Eighth Army went in for the kill. When the attack in the Argenta defile was launched the commandos maintained the diversion by a series of attacks against the southwest shores of Lake Comacchio, in the course of which 40 (Royal Marines) Commando made an astonishing night attack along a floodbank, a battle in which they suffered severely in order to draw off German troops from the 78th Division's road to Argenta. As a result of the Argenta breakthrough, the German armies in Italy surrendered unconditionally.

The Search Goes On

Digested by the MILITARY REVIEW from an article by Squadron Leader J. A. G. Croxson in "Royal Air Force Journal" (Great Britain) January 1946.

MANY thousands of RAF air crewmen lie in nameless graves in almost every part of Europe and, so that next-of-kin may have details of the last resting place of their sons and husbands, Air Ministry has set up an organization known as the Missing Research and Enquiry Service. From the Western European headquarters in Paris the organization directs the work of search units in Germany, France, Belgium, Holland, Denmark and Norway. These units are staffed by Royal Air Force ex-prisoners of war, chosen for their experience of what happened when an aircraft was hit over Germany, and their knowledge of German.

Europe's Largest Graveyard

At Bunde, Westphalia, working with the Displaced Persons and Prisoners of War Division of the Control Commission, is No. 8 Section of the Missing Research and Enquiry Service. From this Section, five search teams are already operating all over the British, American, and French occupied zones of Germany.

An inquiry is received in London asking Air Ministry to trace the last resting place of an air crew member who was reported missing from a raid over Germany. The Air Ministry Casualty Branch then prepares a case report, compiled from information supplied by repatriated prisoners of war, from captured German documents, or from other sources.

A senior officer in charge of the Section of Bunde explained how a search team operates. First task is to fix the location from the details received. Then the search for information begins. One method is to make area sweeps in such districts as the Ruhr, where large numbers of aircraft are known to have crashed, in the hope of obtaining information by careful combing. The method usually employed, however, is to follow up direct inquiries from London.

Records Destroyed

First call is nearly always on the *burgomeister*, who is made to produce his records. Sometimes these give direct clue as to the date and time of the crash and reveal what was done with the remains of the crew. Too often, unfortunately, these records were confiscated by the *Wehrmacht* or deliberately destroyed because the air crewmen had received brutal treatment at the hands of the local population. Cases of ill-treatment have been traced in the Ruhr, Hamburg, Leipzig and Berlin. In such cases, full details have been sent to the War Crimes section of the Judge Advocate General's branch for action.

If nothing is forthcoming from the *burgomeister's* records, contact is made next with the local padre for, where air crewmen have been buried in the local churchyard, records are usually kept.

Aircrafts Parts Found

The task of the search team is simplified once the identity of the aircraft can be established. In many cases, years after the incident, a search of the site of the crash has yielded parts of aircraft bearing traceable numbers, which can be related by the Air Ministry to specific aircraft. In most cases, however, all means of identification, engines, aircraft parts, as well as personal possessions of air crewmen, were removed by *Luftwaffe* salvage units and taken back to their headquarters. Too often, again, these headquarters were bombed and all records destroyed. Close liaison with the British civilian censorship has

provided vital clues from passages in letters. For instance: "Last night Franz and I saw a British bomber shot down here—they buried the crew today in the churchyard." In the internal chaos during the last weeks of the war, thousands of letters remained unposted and were recovered, to be sifted carefully for such information.

Laundry Mark Clue

Where graves are marked "unknown" and where exhaustive questioning in the district has failed to provide clues to the identity of buried air crewmen, officers of search parties are empowered, through the Graves Service or the local Military Government commander, to arrange for exhumation of remains. Although so far, this has been carried out only in rare instances, cases have been reported where it has been possible to establish identity through a laundry mark on a shirt or a button on a tunic. Usually, however, as dead air crewmen were buried by slave laborers, all tunics and other identifiable clothing were removed before burial.

Some idea of the magnitude of the task facing these search teams can be obtained from the fact that air crewmen were reported missing right from 3 September 1939. There are cases in 1940 of missing airmen of Hampden bombers, a type of aircraft long ago replaced on operations by four-engined Lancasters, Stirlings and Halifaxes.

In the majority of earlier cases of air crewmen missing in Germany, it has been found almost impossible, owing to the passage of years, to find the slightest trace. Persons who might have been able to help have long ago left the districts, perhaps have been killed by bombing. In the Ruhr areas, where so many aircraft crashed, it is virtually impossible to find the site of graves, many have been bombed, remains reburied and bombed again. In Cologne, the situation is hopeless—nearly all buildings are flat, all possible contacts gone.

Crashes Reconstructed

Often search officers have to reconstruct a crash, either from the remains of the wreckage or from accounts by local residents. In one case, a German who was being questioned, stated definitely that he had heard two distinct explosions. By visiting the scene where two aircraft had crashed close together, the search officer was able to establish that they had collided in the air and had not fallen to a German night fighter. In another case, careful inquiries led to a school teacher who remembered that a male relative, later killed while serving with the *Wehrmacht*, had picked up an identity bracelet near the scene of the crash and she remembered quite clearly the name on the bracelet.

Every case takes at least two days of minute inquiry, during the course of which as many as a dozen persons have to be interrogated in scattered localities. In France and other Allied countries, where willing cooperation has been forthcoming, inquiries are more easily concluded. Often in these countries, local inhabitants, hearing of the presence of a search team in the district have come forward with identifiable objects taken from the bodies of air crewmen and hidden away before *Luftwaffe* search teams could reach the spot.

No clue is too trivial to be followed up, no journey too long to gain the slightest scrap of information which will help a search section to write "case completed" on its report.